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analog

SCIENCE FACT — SCIENCE FICTION

THE HATE DISEASE | BY MURRAY LEINSTER

A TALE OF THE INTERPLANETARY MEDICAL SERVICE

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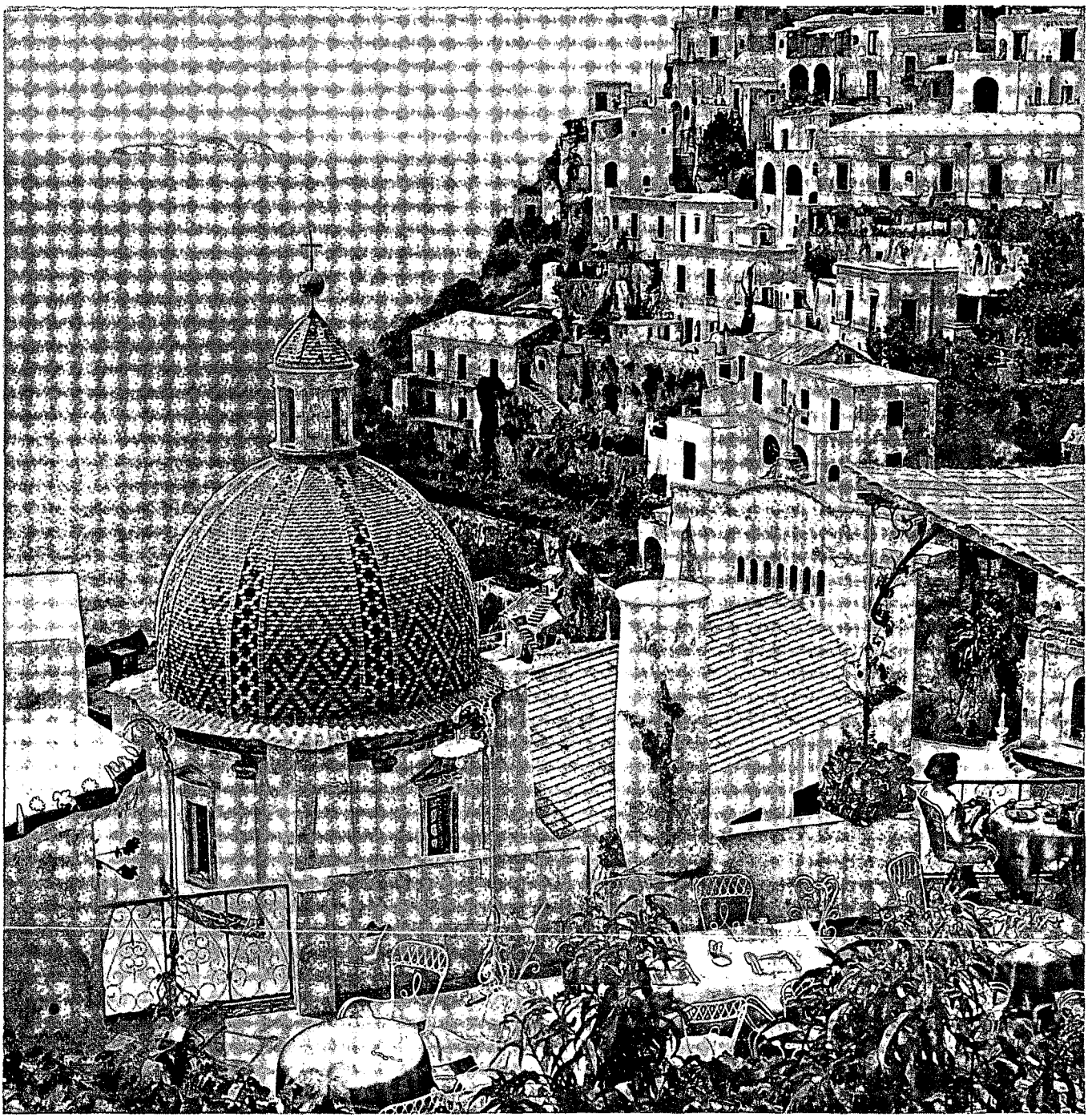
Europe this Summer?



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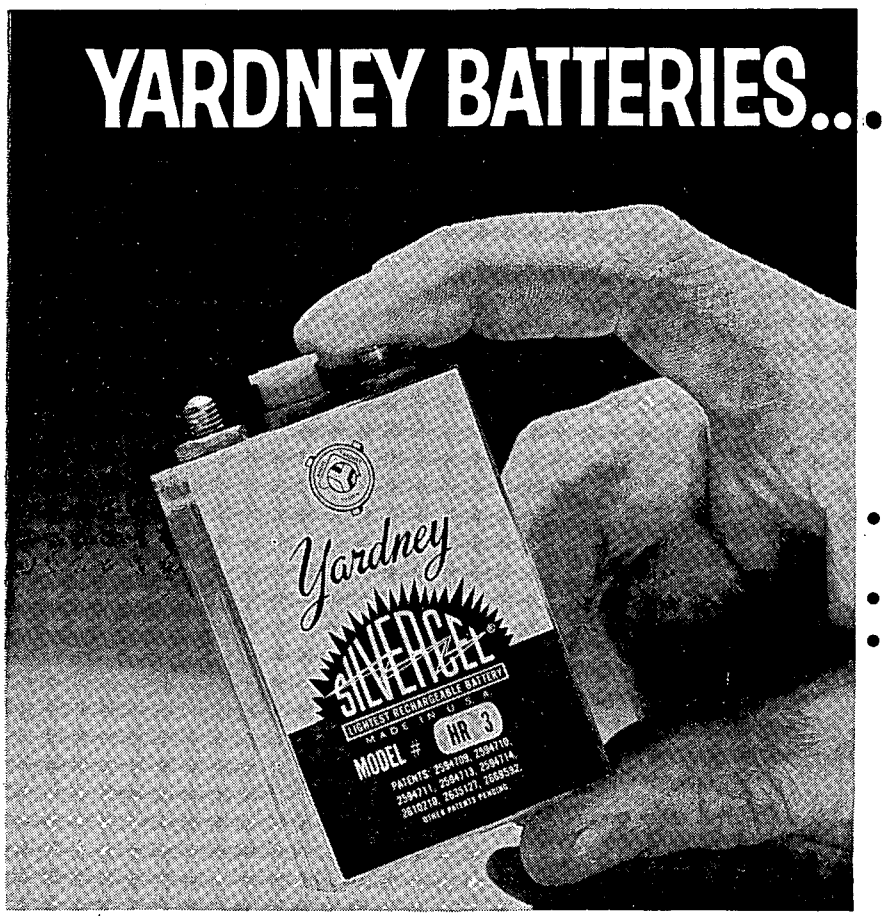

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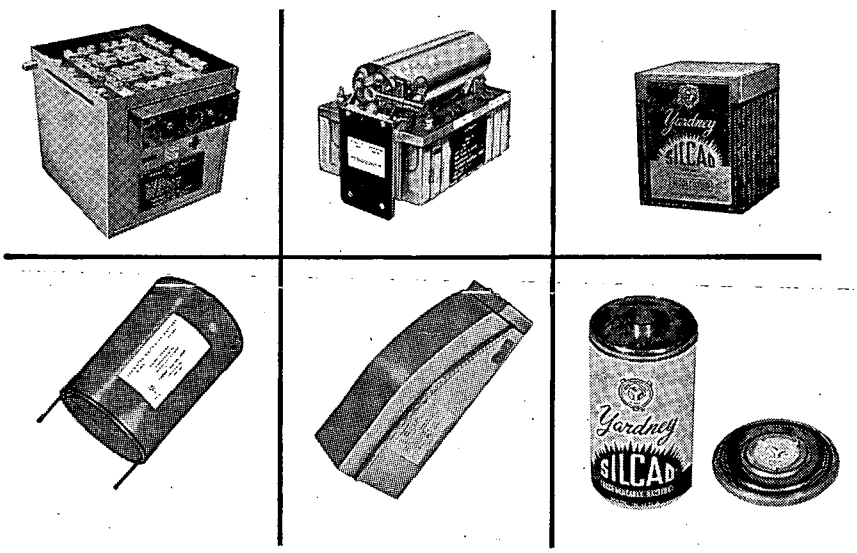

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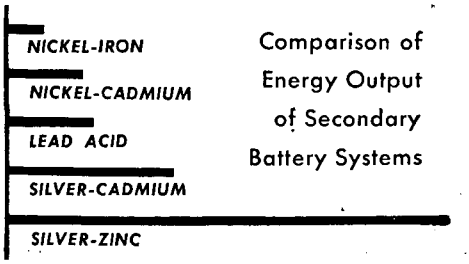

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analog

SCIENCE FACT — SCIENCE FICTION

SCIENCE FACT

CHANGE
R. A. J. Phillips 8

NOVELETTE

THE HATE DISEASE
Murray Leinster 17
"TO INVADE NEW YORK . . ."
Irwin Lewis 39
PATRIOT
Frank A. Javor 45
CONTROLLED EXPERIMENT
Arthur Porges 51

SERIAL

THE ETHICAL ENGINEER (Conclusion)
Harry Harrison 53

READERS' DEPARTMENT

Brass Tacks 4
The Editor's Page 6
In Times to Come 38
The Analytical Laboratory 44
Report on Crucial Experiment—March
Joseph Goodavage 84
The Reference Library
P. Schuyler Miller 86

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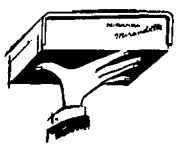

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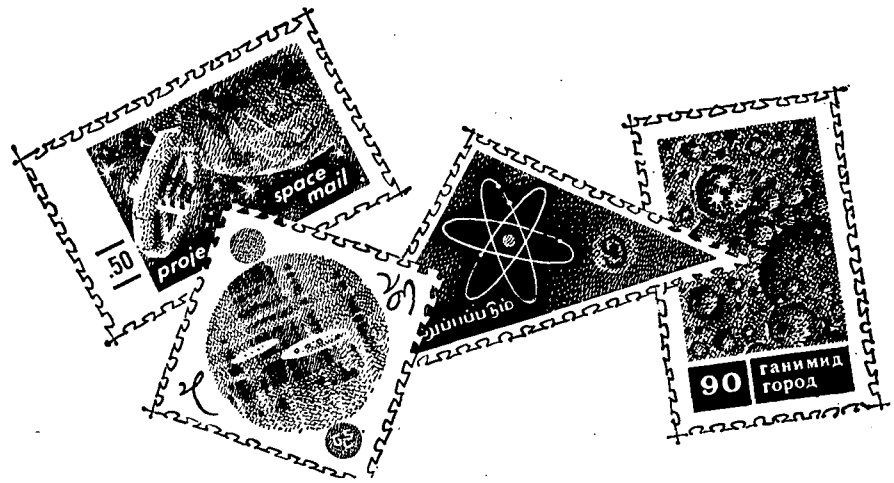

BRASS·TACKS

Dear Mr. Campbell:

I trust it is in order to write on subjects raised by two of your correspondents in the same issue (October 1962).

The question of the oxygen content of the atmosphere, and of its "consumption" by man, at the same time as the natural oxygen producing processes are being cut off, again by man, had also occurred to me some time ago. It was however, the nature of the balancing mechanism which has maintained the proportion of oxygen steady over the period in which we have been able to measure it, which has interested me.

In most natural processes there is some feed-back process whereby a change in a particular condition produces a variation elsewhere which restores the stable order of things. Is the production and consumption of oxygen a process in which there is no regulating mechanism? If so, then it is evident that, as your correspondent says, there is a limit to the present rate of our activities affecting this vital factor of our environment which we overstep at our peril.

Concerning the fate of inventors and their inventions, I think that W. D. Munroe has correctly stated the case, but fear that his solution still does not get at the root of the problem, which is financial.

Apart from the kind of invention that does in fact produce millions from an idea which cost the inventor nothing except the cost of the writing materials to set down the invention, the great bulk of inventions need a lot of money in the early stages to even prove that they have a commercial future. Most inventors are only too ready, as I know from bitter personal experience, to risk their all to make their idea a financial success.

They fail usually because it is rare to find in one and the same man the mind that can conceive a new thing and the knowledge to make that thing a commercial success. By the time they have exhausted their small resources in even getting some kind of a model made, they have neither the time or the money to hawk it around to a multitude of firms to find one who could take it the next step.

Of my own inventions only those of specific interest to my employers have seen the light of day, because the money was forthcoming to back them. The rest will remain in note books and half finished models, until somebody else thinks of them, or the money becomes available to do anything with them.

Any organization which set out to act as the foster parent of inventions would have to have vast resources in relation to which the fee which your correspondent mentions would be insignificant. It could only act as a kind of a filter of those inventions which are most readily converted to commercial exploitation, and all the rest would have to be rejected, no matter how good their potential value.

It is like so many other things in

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this hard world of ours. Money will only be found for things of military necessity, or which can show a reasonable chance of financial return on the capital invested. Everything else is left to the occasional philanthropist, or meeting an individual or firm prepared to take a chance.

It can be argued that the world is the loser by the countless inventions which are stillborn, starved of money which can make them live, just as it can be argued that the world is the loser for those who die of hunger, or of diseases which more money on research could abolish.

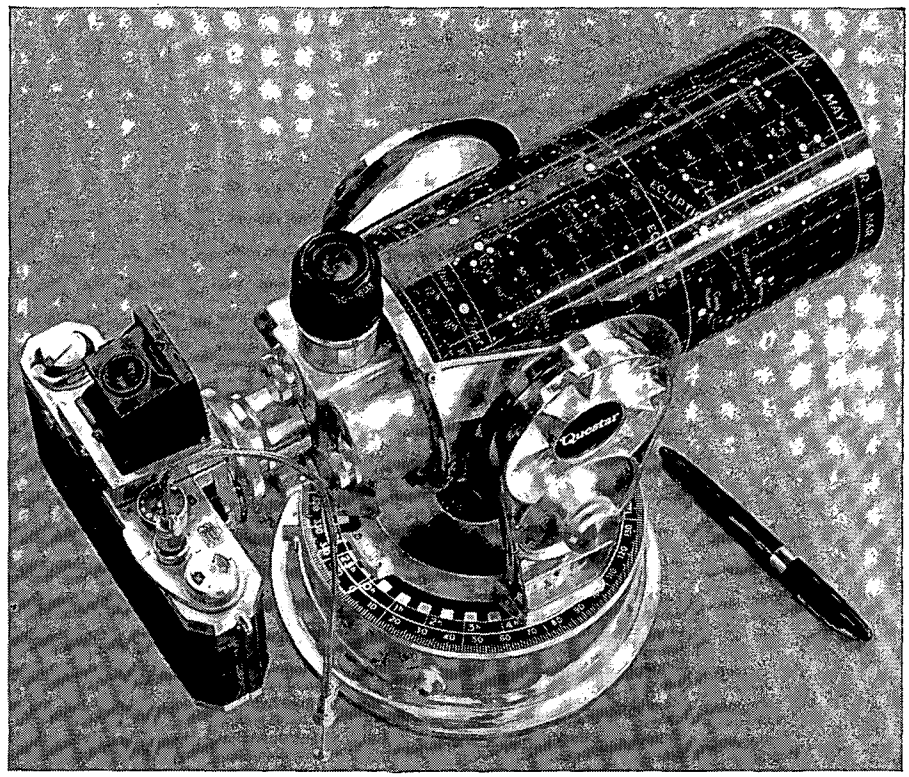
But there simply isn't enough money to go round for everything. Since the very essence of sound finance, which itself makes money available, is the reduction of risk, it follows that the money will only be available for ideas having a minimum risk, regardless of their worth. The world has progressed in spite of this because amongst the countless inventors who only have good ideas, there are the exceptional men who not only have good ideas, but the business acumen to make money out of them. Once such a man scores his first success, his financial future is assured, for the freedom from immediate financial worries and the detail running of his early projects, will give him more time to concentrate on his basic activity—invention.

If W. O. Munroe does go ahead, he will have the consolation of at least preserving a few ideas which otherwise will be lost.

B. A. VUILLE, A.M.I.E.E.

■ *There is a difficulty; risk comes in two styles—the risk of taking-a-risk, and the risk of not-taking-the-risk. Currently most of the world is in a security-safety-status-quo mood, and won't take risks. Progress is made in periods—or areas—where people do take risks, as witness the vast strides made by the U.S. during the Nineteenth Century. Currently, the Russians are taking more technological risks—and are progressing astonishingly, considering what they had only forty years ago.*

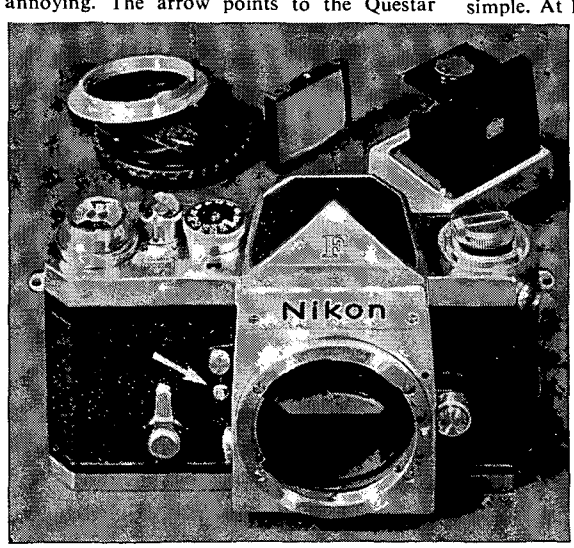
continued on page 95



May we tell you about the first wholly satisfactory camera body for use with Questar? It is a special Questar-modified Nikon F, obtainable only from us.

The problem of taking high resolution pictures through the superfine high-power Questar telescope on 35-mm. film can be reduced to three principal factors: lack of vibration, sharp focus, and correctly thin negatives. The last critical factor, exposure time, can now be measured at the image itself with a CdS lightmeter at Questar's 40x eyepiece.

Vibration during exposure is our chief enemy. Images of perfect optics are formed by an infinite number of overlapping perfect diffraction images. The tiny round dot of Questar's diffraction image, the Airy disk, is only about .0002 inch across. When a reflex mirror slams up a fraction of a second before the roller-blind curtain slit sweeps across the film, a vibration is usually set up of some .001 inch amplitude. Pictures taken before these oscillations are damped out give a fuzzy picture when enlarged. Standard Nikon F bodies can lock the mirror up, allowing the featherweight ball-bearing titanium foil focal plane shutter to work alone with a visible shock of only the dot's width, most of which is post facto effect, after exposure. This gives us negatives so sharp we could not tell them from those taken by waving a black card. But being blind between exposures is most annoying. The arrow points to the Questar modification, a tiny button which releases the mirror any time after you have checked everything and are ready to expose. Price of Questar-modified standard Nikon F body, as shown, is $259.60 with bakelite cap. (We regret that we cannot have your own Nikon body modified.) Cable release, $3.95. Photomic finder, $99.50. 50-mm. f/2 Auto-Nikkor Lens, $90.00. Auto-Nikkor f/1.4 50-mm. Lens, $155.00.



Sharp focus has always been a problem with long-focus telescopes. With camera close-coupled, Questar works at f/16 at 56 inches. With 2-inch extension tubes to reduce vignetting, f/18 at 64 inches. These focal ratios give such dim views that the image is hard to see. The standard split-prism rangefinder works only with fast, low f numbers. But Nikon's Type C interchangeable groundglass, with clear center and hairline cross, at $17.50, gives brilliant images with a mark to keep the eye from accommodating in front or behind the focal plane. At right is the waist level finder, $22.50, which permits best view of the Type C cross with eye up close to its lens.

The new cadmium sulphide light meters, with their small openings, have been used by Questar owners to apply directly to visual eyepiece or camera views of the image, to get an actual reading of what the image unit brightness is regardless of magnification of all nature's variables. We have little data on this at present. Recalibration is necessary, but we hear it is simple. At long last we can completely ignore the variables of nature, due to geographical location, sun's intensity, water vapor, time of year and day—all the guesswork which makes exposure tables impossible. The able photographer may locate the subject with Questar's 40-80x eyepiece, then pop the CdS cell over exit pupil of ocular and take a reading to determine speed.

At upper left is a new, more compact ring adapter, $10.00, to secure Nikon F bodies to Questar's $23.50 basic camera coupling outfit, a multi-purpose device described in detail on page 26 of the Questar booklet. Questars still cost only $995, or $1100 with quartz mirror for best thermal stability. Each is a gem of superfine optics, whose sharpness might eventually be equalled, but can never be surpassed.

QUESTAR

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AN EDITORIAL BY
JOHN W. CAMPBELL

A PLACE FOR THE SUBCONSCIOUS

There's a huge difference between an intellectual conviction—no matter how completely sincere—and an emotional feeling of belief. An intellectual conviction is usually logical, and sometimes it's even rational—but it lacks real motivating power.

The difference between "logical" and "rational" really becomes true, deep feeling-awareness only when you have the experience of arguing with someone who is perfectly logical, absolutely and irrefutably logical . . . and irrational. The "computing psychotic" type of the committed insane represents the end-example of the type. His logic will be absolutely flawless; you'll shortly find that you, not he, are guilty of false syllogisms, *argumentum ad hominem*, distributed-middle, and other forms of bad logic.

Only he goes on being magnificently irrational, despite his perfect logic.

The problem is, of course, that perfect logic applied to false postulates yields perfectly logical irrationality. The Master False Postulate of the system the computing psychotic operates on is one widely accepted: "Anything that is logical is necessarily rational." Since his logic is flawless, that proves to him that he's perfectly rational.

The great difficulty lies in the fact that while we have worked out a codified, formal technique of manipulating postulates—that's what we mean by "Logic"—we have no codified or formalized system for *deriving* postulates. Thus you can check on the rigor of another man's logical thinking, and cross-communicate with him as to the nature and validity of the logical steps, but you can not check his derivation of the postulates he's manipulating so logically.

For example, when Newton studied Kepler's laws of planetary motion, Galileo's work on falling bodies, pendulums, accelerations, et cetera, he abstracted from the data certain postulates, now known as Newton's Laws of Motion and Gravity.

continued on page 92

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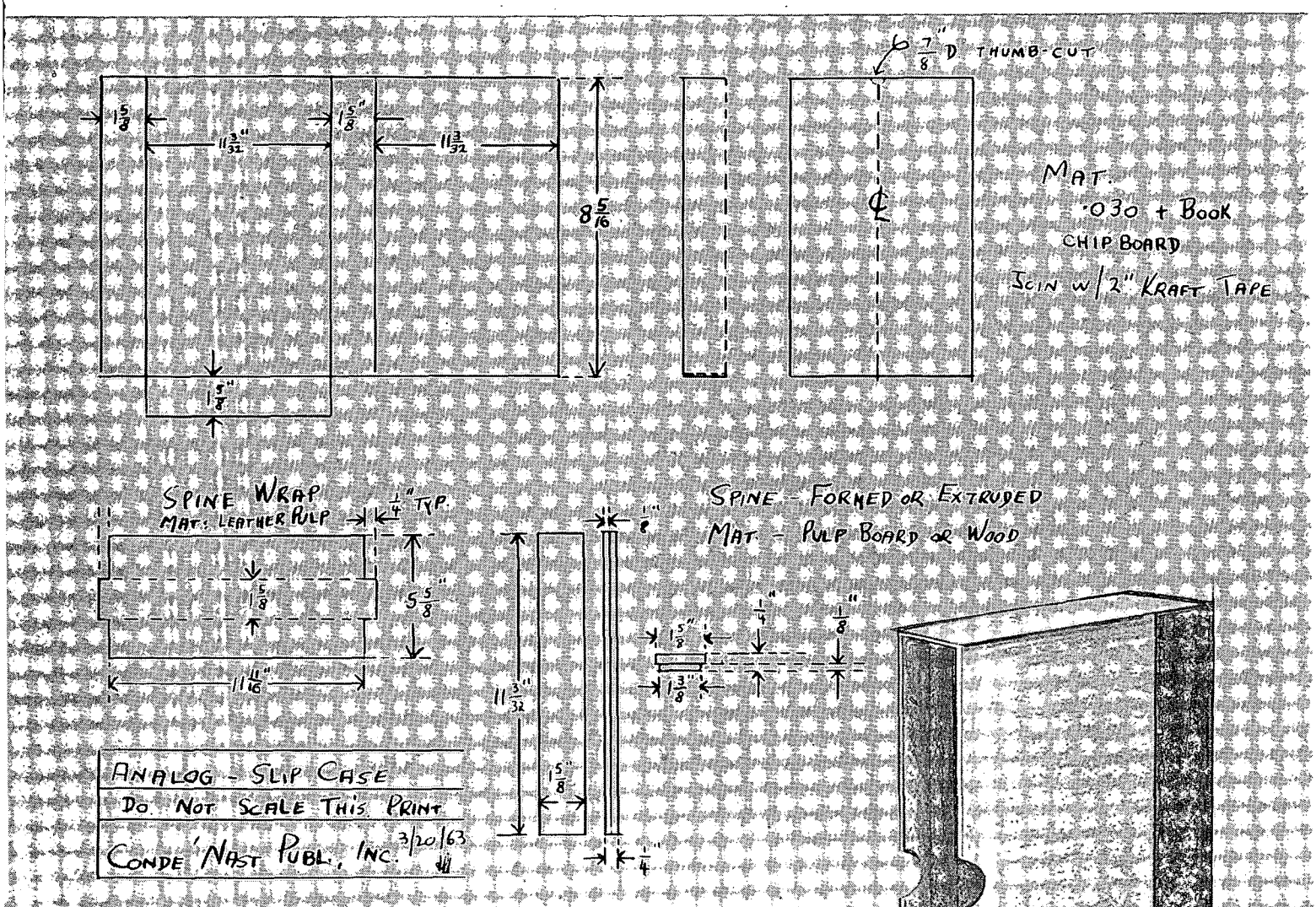
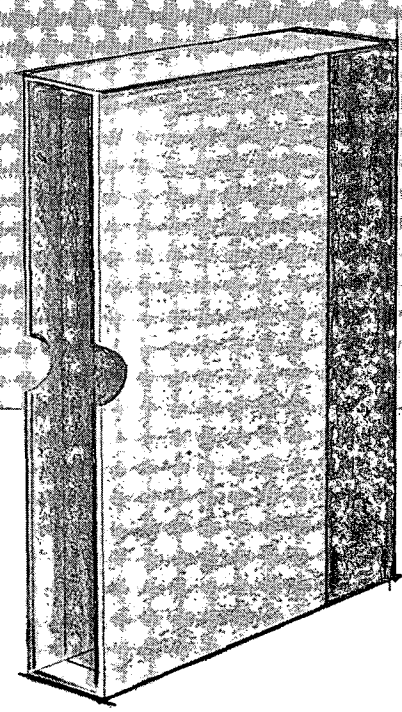
analog's for the future...

. . . in more ways than one, of course! And if you want your ANALOGS in good condition in the future, these binder-boxes will be a large help. I've got bound copies myself, of course—and I wish, now, I'd had this box-type binder. Six issues bound in a volume make things hard to handle; the result's too thick. The construction specs are below:





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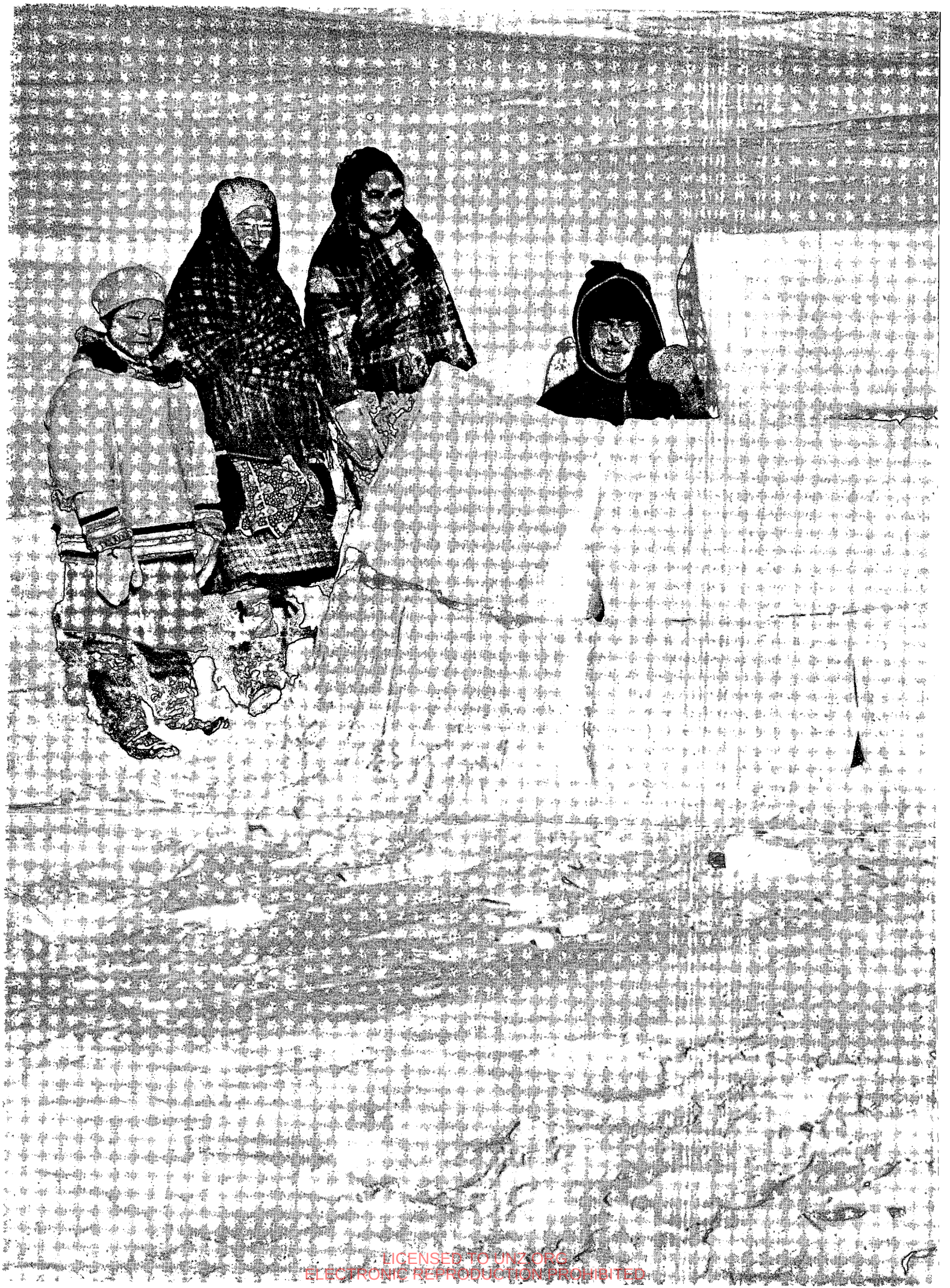

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CHANGE

When men first contact the natives of another planet, we'll have problems, whether Man is ahead, or the Aliens are. And the essence of the problem is, "What constitutes 'helping' the natives of a different world?" The closest approach to that in history, the only near-example we have, is the story of the European and the Eskimo. The thing that makes that situation unique is that the Eskimo, unlike the African Negro or the American Indian, eagerly accepted schooling.

But . . . there were egregious mistakes . . .

R. A. J. PHILLIPS

Fig. 1, left. The Eskimo's solutions to the problems of living in the Arctic are magnificent. No finer example of adapting local materials to produce adequately thermally insulated housing has ever been achieved. But . . . the happy smiles come from the relief that, at last, the igloo can be built. What do you do when the Arctic winter has started, but there isn't yet snow enough . . . ?

Fig. 2. And the snow has to be the right kind. Loose, fluffy snow won't do, of course. And there's another problem . . .

N.F.B.

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CHANGE

Perhaps you have been sitting on the beach of Northern Baffin Island some summer day, and watching while the world was changing.

At your feet is the ice pack, thick, shoving, broken, grinding south: a multi-billion ton souvenir not just of the winter past but of countless years back to the last Ice Age. That endless mass is like a ship carrying a deadly cargo—cold.

You are watching the beginning of the next Ice Age.

Down sifts the packaged cold into the Atlantic, there to cool the water, the air and other lands. This natural air-conditioner is moving in considerable quantities. Over at Jacobshavn in Greenland, the 300-foot high ice cap is sliding into the water at a daily rate of sixty feet: 20 million tons of ice dropping into the Atlantic every day of the year from this one spot. If you follow it south, you'll see its effect first on the higher hills of the Atlantic seaboard where the permanent snowline inches downward. If you stay around long enough—a few thousand years might do—you'll notice it in the plains and valleys, in the villages and cities which will gradually slip into frozen immobility.

But the north, meanwhile, is getting warmer. The treeline across Canada's Northwest Territories is edging northwards. The Arctic is importing heat and exporting cold. It could all be changed, they say, with a little construction effort: perhaps a barrier from north Baffin Island to Greenland, or a dam across the Bering Straits. Otherwise . . . ?

We'll settle that some other evening. That's not all that's happening. The winds of change are sweeping across the human beings of the Arctic as the forces of southern civilization move like an inexorable ice pack to change the environment of the Eskimos.

Human history is the story of civili-

Fig. 3. The Peter Bawden Drilling Ltd. engineers, seeking oil in the Canadian Arctic have certain problems, too. Drilling in winter is a bit too difficult, where temperatures go to 80° below zero, and in spring . . .

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zations meeting, but this contact is different from the rest. It involves one people that has survived about the toughest physical environment on earth with the most basic of defenses. And it involves the highest material culture our planet has ever known. On the one hand, eleven thousand people; on the other, tens of millions. It is happening, not in the private preserve of distant empire builders or anthropologists, but in the midst of modern North America. It is happening at that strange stage of western development when something like a collective social conscience has developed. A collective social conscience means that we are never consciously nasty.

This meeting of civilizations, unpremeditated and inevitable as it was, has a social purpose. The objective, within a generation, is not only to provide a stone-age people with the rights and responsibilities of citizenship in a modern democratic society, but to do it in such a way that the educational process is mutual: to do it in such a way that the peer civilization does not take away more than it really gives.

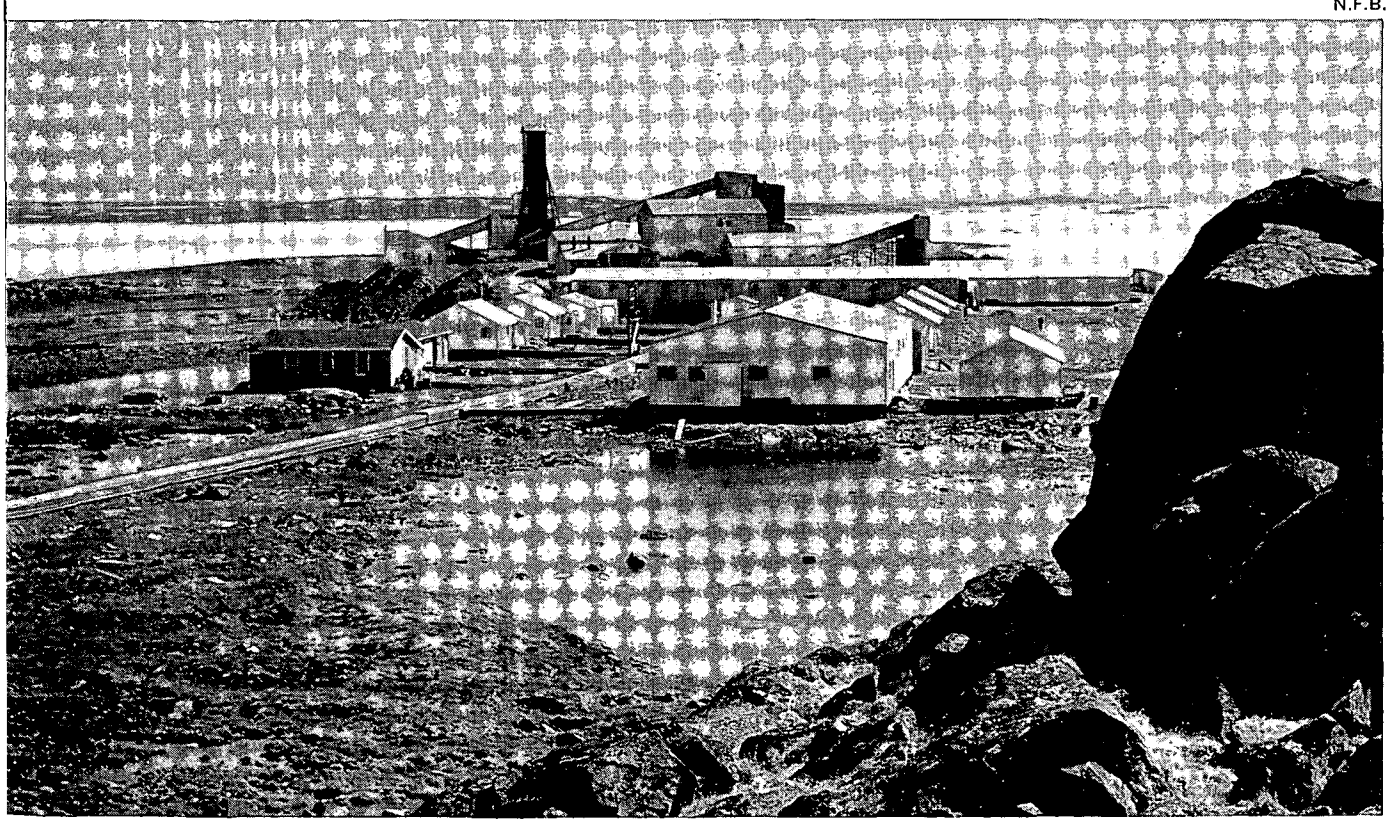
In some ways, looking for the best of both worlds is easy: like health. There just isn't any medical science amongst the Eskimos. Or is there? What about the religious taboos on eating certain meats at certain times of year? Physiologists now affirm that these foods were virtually poisonous. In nutritional rules, anyway, the Eskimos seem to have been more rational than the rest of us. They do have disease, which called for a massive offensive by modern medicine. It has been successful to the extent that we have now cured some of the disease that in the past fifty years we have brought. Before the white man came, probably tuberculosis, measles and poliomyelitis were virtually unknown in the Arctic; possibly even the common cold. Heart disease still is unknown; also stomach ulcers and drug addiction.

Ah, we say, how wonderful was the primitive civilization without the tribulations of these jangled times: no tensions, no mixed-up people. It isn't that simple, judging from the one community where an intensive study has been made. The Pelly Bay Eskimos, who now number about one hundred twenty, have chalked up thirty-five successful suicides and fifteen unsuccessful suicides in the past fifty years. It was about twenty-five years ago that the missionaries came to the community, and all the Eskimos were converted to Christianity, but the incidence of suicides did not change much one way or the other. That makes their rate of suicide, despite half the average North American life expectancy, about thirty times as high as in the United States.

Whatever the virtues of the so-called primitive civilization may have been, the absence of psychiatric disturbance does not appear to have been one of them. Why should it be? Is the rat race through the executive floors

Fig. 4. The Arctic is a mineral-rich area—but it takes a great deal of adapting to be able to live and work there. The term "dry land" becomes very confused indeed in the Arctic spring. This is a nickel mine at Rankin Inlet, N. W. T.

N.F.B.



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any less psychologically disturbing than feelings of inadequacy as a hunter, with implications not only of social failure but of death for one's family? But the Eskimos have apparently not allowed these tensions to wear away at their bodies. They seem to possess the secret weapon against our number one killer—heart disease.

There are other secrets the Eskimos seem to have. Why didn't they die long ago of scurvy as the explorers did who traveled the Arctic in their sailing ships? If fat causes a high cholesterol level, why have the Eskimos been able to live on the fattiest diet in the world without ill effect? Not that life was easy. Starvation and sudden disaster kept the population in check, though at a level somewhat higher than now. Then tuberculosis took its toll, but it has been beaten back. Infant mortality is the present problem, and the killers are the bronchial ailments for which our civilization is also responsible.

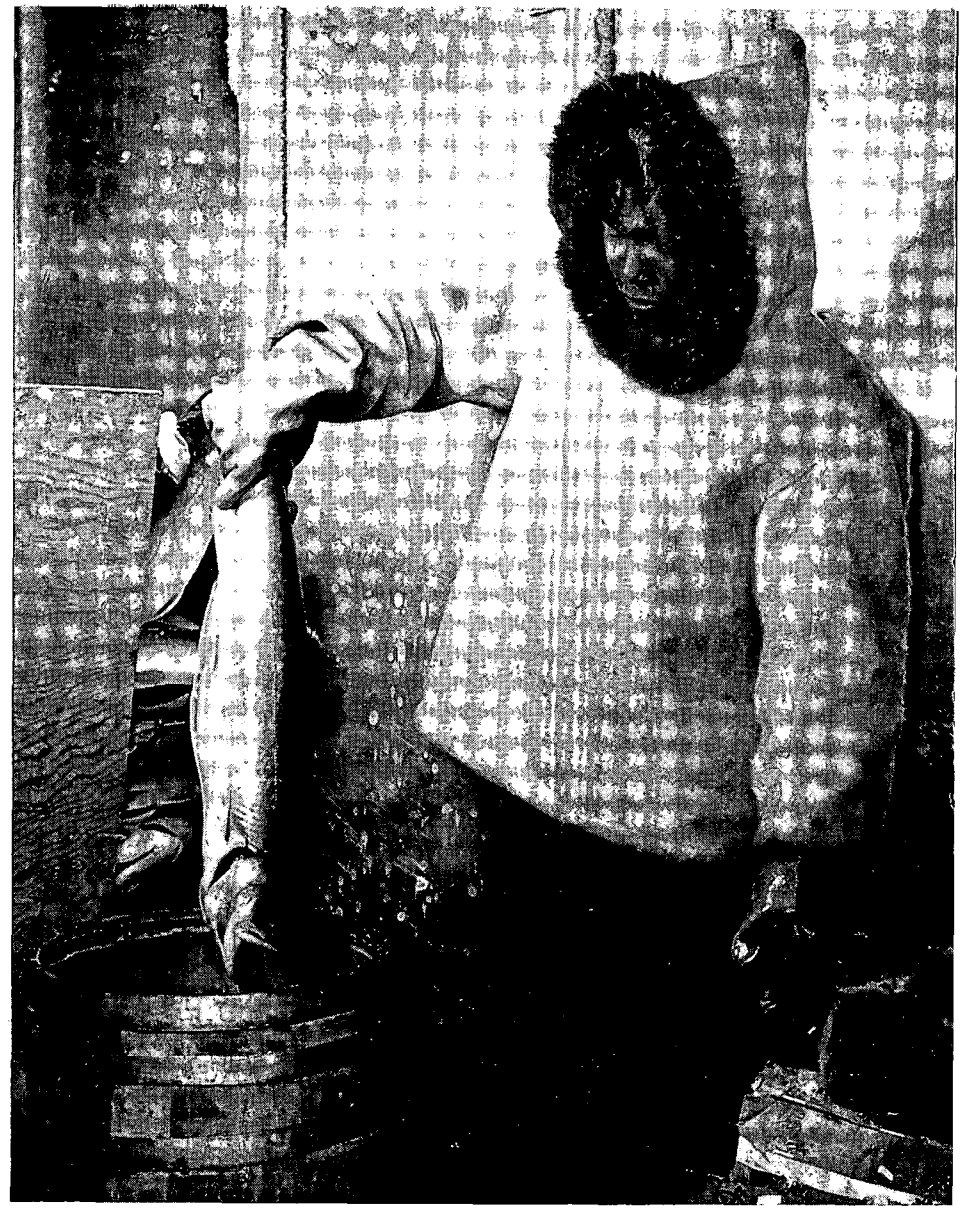

Fig. 5. This Eskimo—Johnny Morgan—is suitably dressed for his work inside a portable quick-freeze unit at George River in Arctic Quebec. The existence of freezers has made it possible for the Eskimo to develop an Arctic resource hitherto available, but unusable—the superb Arctic char. A major fishing industry is growing, as gourmet markets in Europe and North America discover these fish. Notice that Johnny Morgan represents a genuine interaction of two widely divergent cultures; his parka is a traditional Eskimo design—unsurpassed for Arctic climates, either natural or freezer made—but is constructed of technologically-developed material, on technically perfected sewing machines. The plastic gloves surpass any native material for such cold, wet work.

All the facilities of modern research working at high gear for many years have yet to produce any Arctic clothing to equal what the Eskimos devised for themselves. Their materials, notably the snow-shedding caribou, were perfect for the Arctic climate, and the layered design with its flexible ventilation was ingenious. We cannot duplicate the material, but the form—without improvement—is seen in every snow-covered schoolyard and ski slope in North America. But let us not overlook the profound contribution that was made to Eskimo clothing design by the advance guard of our civilization. They were able to point out to the ignorant Eskimos that it is immoral for women to wear pants.

No doubt the new enlightenment produced a higher moral and sartorial tone in the white man's drawing room, and sales across the counter of his store. The statistics on the effects of skirts on Eskimo women in a death struggle with the Arctic environment are mercifully lacking.

Then there was the igloo—or more accurately, the snow house, for "igloo" means any kind of house. Architecturally brilliant, the igloo was perfectly suited to the old civilization. In the thick fur of caribou garments lay the warmth the body needed. Then the white man brought the rifle but he forgot to bring the lessons on conservation. The caribou herds, once numbered in the millions, dwindled in a few decades to about 200,000 spread across a million square miles of Arctic. The igloo became a death trap: inadequate at any time for those inadequately clad; miserable, when the

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noon sun of spring melted its walls and soaked possessions; impossible, in the shrewd winds of early winter when the cold has come, but not the snow.

Ironically, among all the white man changed consciously and unconsciously in Eskimo ways, the igloo itself remained—preserved in a cocoon of sentimentality. The igloo charmed the white man even after it began to freeze the Eskimo. The shacks which brought some dryness and warmth were an offense to the aesthetics of the newcomer.

Alas, the igloo. It will gradually disappear in the meshing of civilization—not because the white man wants to see it go, but partly because he made it impossible to preserve. For its final epitaph we might say: "Here, in the warm spring of 19—, the last igloo melted. It was the only important architectural concept originating in North America from 4,000 B.C. until Frank Lloyd Wright."

Well, maybe that's not quite true, for some Eskimos on Baffin Island have achieved the architecture without the agony, by living in igloos of foam plastic blocks. The arrival of this material on the beach was the final confirmation in Eskimo minds of the utter madness of the white man: now, the occupants have decided that maybe the white man isn't crazy after all.

Perhaps we should look again at that plastic igloo, for it may turn out to be a monument of our age: one of those rare examples of two civiliza-

Fig. 6. Twilight takes a long time at Winter Harbor, N. W. T.—but the Peter Bawden Drilling Ltd. engineers are learning to work with the Arctic conditions . . . with Eskimo help and instruction!

N.F.B.

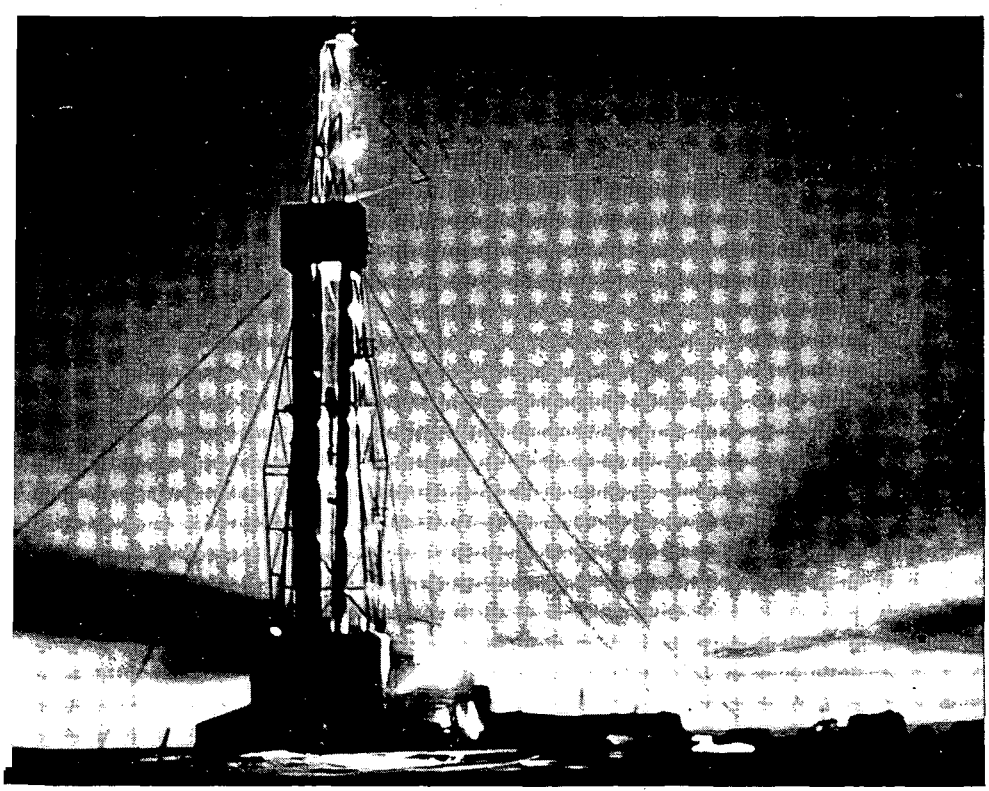

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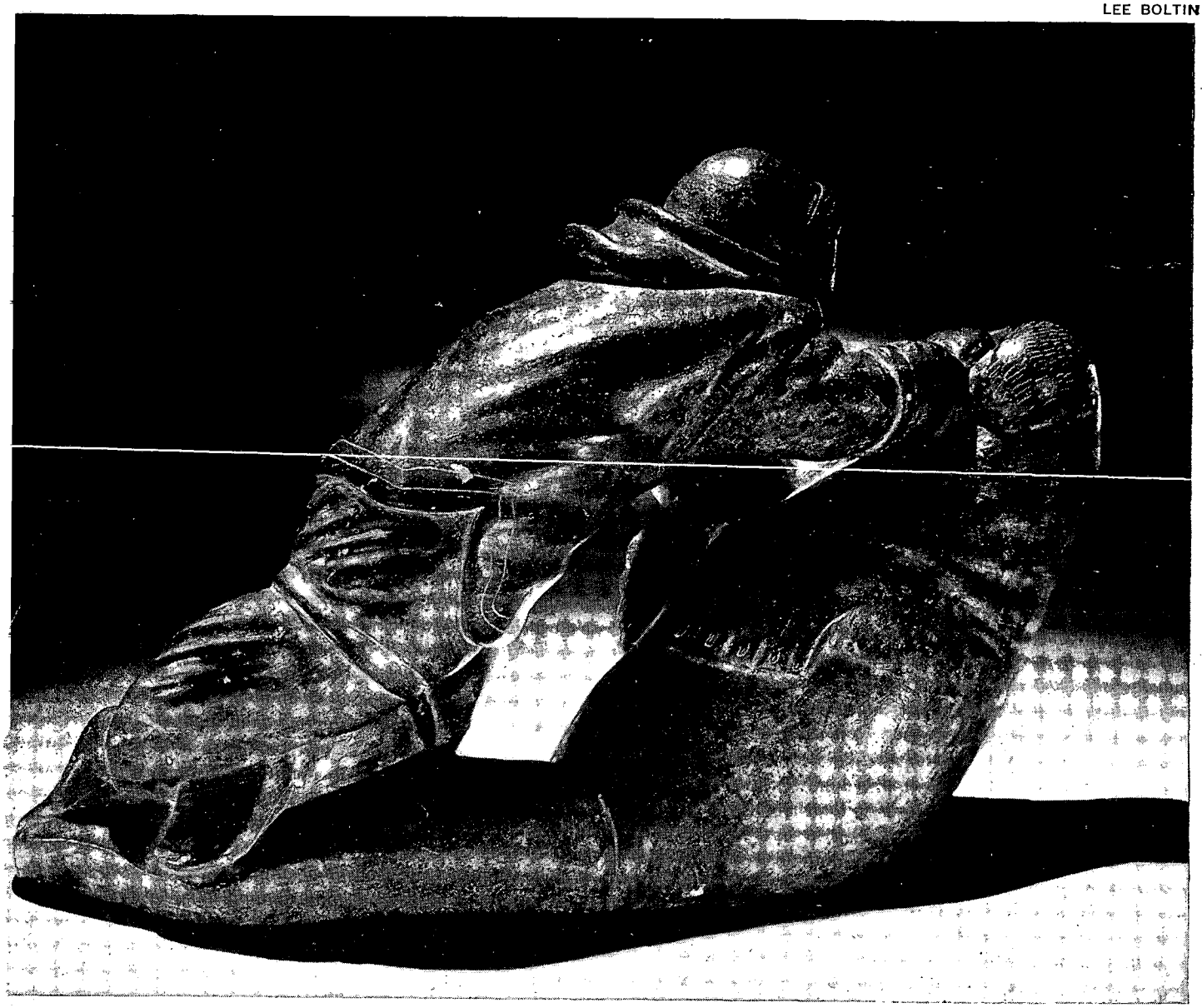
Fig. 7. The Eskimos have developed a series of art-forms that are unique in several respects. Most important, these art-forms were developed by Eskimos to satisfy a non-Eskimo market which they themselves developed! The Eskimo dolls, beadwork, soapstone carvings, exceedingly ingenious hand-carved children's toys, and stone-block prints are not traditional art-forms; *they are modified and developed specifically for non-Eskimo markets, by highly creative Eskimo artists.*

LEE BOLTIN



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tions of vastly different material attainment learning from one another. The plastic igloo itself will not last, for there are better European solutions to housing than a small circular dwelling into which rectangular furniture does not fit. Perhaps figuratively as well as literally, it is too low-ceilinged for heads held high.

The other solutions, however, are based on a European concept of cash income. To have a comfortable conventional house, adapted for Arctic living, one must move very far away from a natural economy and accept a whole white scale of values which makes houses possible. For example, the primitive might have to accept the idea of wage employment with all the tyranny of the clock that he—happily—does not understand. He has to accept the performance of work—whether unloading a boat, preparing fish for exotic markets, or making crafts—to standards other than the performer's.

We are so accustomed to having to meet standards which society imposes that we forget how another society makes a virtue of individual perfection, individually defined. The Eskimo hunted the way *he* knew best: why shouldn't he now carve, or sew, or freeze fish the way *he* knows best just because the white man is buying the product?

Conformity is a lesson that comes slowly. The Eskimo for half a century has been alert to the material benefits that trapping the white fox will bring, and he knows that the amount of benefit for each pelt depends on its condition. The Eskimo was prepared to turn his world upside down to set traps for the wretched little beasts to humor the rich white man. But after all these years, rarely has the Eskimo gone the other mile to strive for the white man's standards of the fox. That's a nuisance without much sense. The Eskimo is prepared to suffer the economic consequences of poorly preserved skins.

There's the conflict for the primitive man: how much of a birthright to sacrifice for a mess of pottage? What he may have to sacrifice is nothing as simple as mere conformity to white man's ways. It is in part conformity within his own society, for apparently material progress in our age depends upon social conformity. Ask Dr. Dichter.

But there's a conflict for the sophisticated white man, too. We assume that the white man of today really has a conscience for his fellow man. We assume also that the white man's self-interest requires the development of a self-reliant and self-generating Arctic people. How far do we push the primitive to qualify him for our paradise? We can't leave the decision to him: it would be like asking the average New Yorker whether he would prefer to live on the left bank or the right bank of a canal on Mars. He has no real basis for comparison. By the time we brief him, we have probably imposed as many of our ideas as his on the final decision.

The briefing of the Eskimos on such subjects is called education. Everybody agrees that education is a Good Thing, but it is quite another matter to agree on what it should be.

A few years ago at a gathering in Aklavik, some of the old hands were voicing the familiar line about why teach the Eskimos to read a book when you don't need a book to catch muskrats. The happy unanimity was broken by an old Eskimo woman who had never known a day in school. "I have been looking at you white men a long time," she said, "and I don't see any difference between you and us—except education. We'd like a lot more of that."

She was right, of course, for the lack of education was the foundation of the white man's continued superiority over the native. Only through education is any kind of economic or social equality possible.

What kind of equality? What kind of education? The basic problem of those who have accepted responsibility for giving education—they are all white men—is how to give more than they take away. Education, they say, is not to train people for jobs, or even to adapt the primitive to the sophisticated in general. It is to allow the primitive to acquire the most fundamental of citizenship rights, the right to decide his own life. This involves not only a genuine knowledge of the responsibilities ahead, but the equipment to seize the opportunities.

Such a requirement makes the job of education immensely more difficult in this setting of intercultural contact and conflict than it is in any ordinary schoolroom of a North American city. There should be education in two cultures, but there is, as yet, no one available to teach the Eskimo way. The white teacher does not fully understand the Eskimo. There is a great temptation to assume that education means teaching only the white man's knowledge. If we ever do that, we may take away more than we give.

If we teach only in terms of the white man's civilization because all the textbooks are written that way, we promote a rootless confusion. We rob the child of his cultural inheritance, place a barrier between him and his family, between him and the life on the land to which he may wish to return. Even if we were foolish enough to assume that a primitive society has nothing to offer in this late twentieth century, we would still be making a mistake in equipping a primitive child to move only in our sophisticated circles.

For one thing, he is not likely to want to move beyond the country of his home. However odd it may seem to us, there are people in the world who would rather live amidst the harsh surroundings of the Arctic or the jungle than in the kind of environment which we happen to regard as the most suitable for man's destinies and pleasures. It is equally incomprehensible to Eskimos why men should make a choice of living in our asphalt jungles or amidst the enervating heat of our summers when it is possible to enjoy the reverent stillness of the Arctic where man, not the machine or

continued on page 81

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THE HATE DISEASE

The Med Service people hit strange problems as routine; if they weren't weirdos, they weren't tough enough to merit Med Service attention. Now the essence of a weird problem is that it involves a factor nobody ever thought of before . . . or the absence of one nobody ever missed . . .

by MURRAY LEINSTER

ILLUSTRATED BY JOHN SCHOENHERR

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I

The Med Ship *Esclipus Twenty* rode in overdrive while her ship's company drank coffee. Calhoun sipped at a full cup of strong brew, while Murgatroyd the *tormal* drank from the tiny mug suited to his small, furry paws. The astrogation unit showed the percentage of this overdrive hop covered up to now, and the needle was almost around to the stop pin.

There'd been a warning gong an hour ago, notifying that the end of overdrive journeying approached. Hence the coffee. When breakout came, the overdrive field must collapse and the Duhanne cells down near the small ship's keel absorb the energy which maintained it. Then *Esclipus Twenty* would appear in the normal universe of suns and stars with the abruptness of an explosion. She should be somewhere near the sun Tallien. She should then swim toward that sol-type sun and approach Tallien's third planet out at the less-than-light-speed rate necessary for solar-system travel. And presently she should signal down to ground and Calhoun set about the purpose of his three-week journey in overdrive.

His purpose was a routine checkup on public health on Tallien Three. Calhoun had lately completed five such planetary visits, with from one to three weeks of overdrive travel between each pair. When he left Tallien Three he'd head back to Sector Headquarters for more orders about the work of the Interstellar Medical Service.

Murgatroyd zestfully licked his empty cup to get the last least drop of coffee. He said hopefully:

"*Chee?*" He wanted more.

"I'm afraid," said Calhoun, "that you're a sybarite, Murgatroyd. This impassioned desire of yours for coffee disturbs me."

"*Chee!*" said Murgatroyd, with decision.

"It's become a habit," Calhoun told him severely. "You should taper off. Remember, when anything in your environment becomes a normal part of your environment, it becomes a necessity. Coffee should be a luxury, to be savored as such, instead of something you expect and resent being deprived of."

Murgatroyd said impatiently:

"*Chee-chee!*"

"All right, then," said Calhoun, "if you're going to be emotional about it! Pass your cup."

He reached out and Murgatroyd put the tiny object in his hand. He refilled it and passed it back.

"But watch yourself," he advised. "We're landing on Tallien Three. It's just be transferred to us from another sector. It's been neglected. There's been no Med Service inspection for years. There could be misunderstandings."

Murgatroyd said, "*Chee!*" and squatted down to drink.

Calhoun looked at a clock and opened his mouth to speak again, when a taped voice said abruptly:

"*When the gong sounds, breakout will be five seconds off.*"

There was a steady, monotonous *tick, tock, tick, tock,* like a metronome. Calhoun got up and made a casual examination of the ship's instruments. He turned on the vision screens. They were useless in overdrive, of course, Now they were ready to inform him about the normal cosmos as soon as the ship returned to it. He put away the coffee things. Murgatroyd was reluctant to give up his mug until the last possible lick. Then he sat back and elaborately cleaned his whiskers.

Calhoun sat down in the control chair and waited.

"*Bong!*" said the loud-speaker, and Murgatroyd scuttled under a chair. He held on with all four paws and his furry tail. The speaker said, "*Breakout in five seconds . . . four . . . three . . . two . . . one . . .*"

There was a sensation as if all the universe had turned itself inside out, and Calhoun's stomach tried to follow its example. He gulped, and the feeling ended, and the vision screens came alight. Then there were ten thousand myriads of stars, and a sun flaming balefully ahead, and certain very bright objects nearby. They would be planets, and one of them showed as a crescent.

Calhoun checked the solar spectrum as a matter of course. This was the sun Tallien. He checked the brighter specks in view. Three were planets and one a remote brilliant star. The crescent was Tallien Three, third out from its sun and the Med Ship's immediate destination. It was a very good breakout; too good to be anything but luck. Calhoun swung the ship for the crescent planet. He matter-of-factly checked the usual items. He was going in at a high angle to the ecliptic, so meteors and bits of stray celestial trash weren't likely to be bothersome. He made other notes, to kill time.

He reread the data sheets on the planet. It had been colonized three hundred years before. There'd been trouble establishing a human-use ecological system on the planet because the native plants and animals were totally useless to humankind. Native timber could be used in building, but only after drying-out for a period of months. When growing or green it was as much water-saturated as a sponge. There had never been a forest fire here, not even caused by lightning!

There were other oddities. The aboriginal microorganisms here did not attack wastes of introduced terrestrial types. It had been necessary to introduce scavenger organisms from elsewhere. This and other difficulties made it true that only one of the world's five continents was human-occupied. Most of the land surface was strictly as it had been before the landing of men—impenetrable jungles of spongelike flora, dwelt in by a largely unknown useless fauna. Calhoun read on. Population . . . government . . . health statistics . . . He went through the list.

He had time to kill, so he rechecked his course and speed relative to the planet. He and Murgatroyd had dinner. Then he waited until the ship was near enough to report in.

"Med Ship *Esclipus Twenty* calling ground," he said

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when the time came. He taped his own voice as he made the call. "Requesting co-ordinates for landing. Our mass is fifty tons. Repeat, five-oh tons. Purpose of landing, planetary health inspection."

He waited while his taped voice repeated and re-repeated the call. An incoming voice said sharply:

"Calling Med Ship! Cut your signal! Do not acknowledge this call! Cut your signal! Instructions will follow. But cut your signal!"

Calhoun blinked. Of all possible responses to a landing call, orders to stop signaling would be least likely. But after an instant he reached over and stopped the transmission of his voice. It happened to end halfway through a syllable.

Silence. Not quite silence, of course, because there was the taped record of background noise which went on all the time the Med Ship was in space. Without it, the utter absence of noise would be sepulchral.

The voice from outside said:

"You cut off. Good! Now listen! Do not—repeat, do not!—acknowledge this call or respond to any call from anyone else! There is a drastic situation aground. You must not—repeat, must not—fall into the hands of the people now occupying Government Center. Go into orbit. We will try to seize the spaceport so you can be landed. But do not acknowledge this call or respond to any answer from anyone else! Don't do it! Don't do it!"

There was a click, and somehow the silence was clamorous. Calhoun rubbed his nose reflectively with his finger. Murgatroyd, bright-eyed, immediately rubbed his nose with a tiny dark digit. Like all *tormals*, he gloried in imitating human actions, as parrots and parakeets imitate human speech. But suddenly a second voice called in, with a new and strictly professional tone:

"Calling Med Ship!" said this second voice. *"Calling Med Ship! Spaceport Tallien Three calling Med Ship Esclipus Twenty! For landing, repair to co-ordinates—"*

The voice briskly gave specific instructions. It was a strictly professional voice. It repeated the instructions with precision.

Out of sheer habit, Calhoun said, "Acknowledge." Then he added sharply: "Hold it! I've just had an emergency call—"

The first voice interrupted stridently:

"Cut your signal, you fool! I told you not to answer any other call! Cut your signal!"

The strictly professional other voice said coldly:

"Emergency call, eh? That'll be paras. They're better organized than we thought, if they picked up your landing request! There's an emergency, all right! It's the devil of an emergency—it looks like devils! But this is the spaceport. Will you come in?"

"Naturally," said Calhoun. "What's the emergency?"

"You'll find out . . ." That was the professional voice. The other snapped angrily, *"Cut your signal!"* The professional voice again: *". . . you land. It's not . . ." "Cut your signal, you fool! Cut it . . ." The other voice again.*

There was confusion The two voices spoke together. Each was on a tight beam, while Calhoun's call was broadcast. The voices could not hear each other, but each could hear Calhoun.

"Don't listen to them! There's . . ." "to understand, but . . ." "Don't listen! Don't . . ." ". . . When you land."

Then the voice from the spaceport stopped, and Calhoun cut down the volume of the other. It continued to shout, though muffled. It bellowed, as if rattled. It mouthed commands as if they were arguments or reasons. Calhoun listened for fully five minutes. Then he said carefully into his microphone:

"Med Ship *Esclipus Twenty* calling spaceport. I will arrive at given co-ordinates at the time given. I suggest that you take precautions if necessary against interference with my landing. Message ends."

He swung the ship around and aimed for the destination with which he'd been supplied—a place in emptiness five diameters out, with the center of the sun's disk bearing so-and-so and the center of the planet's disk bearing so-and-thus. He turned the communicator volume down still lower. The miniature voice shouted and threatened in the stillness of the Med Ship's control room. After a time Calhoun said reflectively:

"I don't like this, Murgatroyd! An unidentified voice is telling us—and we're Med Ship personnel, Murgatroyd! —who we should speak to and what we should do. Our duty is plainly to ignore such orders. But with dignity, Murgatroyd! We must uphold the dignity of the Med Service!"

Murgatroyd said skeptically:

"Chee?"

"I don't like your attitude," said Calhoun, "but I'll bear in mind that you're often right."

Murgatroyd found a soft place to curl up in. He draped his tail across his nose and lay there, blinking at Calhoun above the furry half-mask.

The little ship drove on. The disk of the planet grew large. Presently it was below. It turned as the ship moved, and from a crescent it became a half-circle and then a gibbous near-oval shape. In the rest of the solar system nothing in particular happened. Small and heavy inner planets swam deliberately in their short orbits around the sun. Outer, gas-giant planets floated even more deliberately in larger paths. There were comets of telescopic size, and there were meteorites, and the sun Tallien sent up monstrous flares, and storms of improbable snow swept about in the methane atmosphere of the greater gas giant of this particular celestial family of this sun and its satellites. But the cosmos in general paid no attention to human activities or usually undesirable intentions. Calhoun listened, frowning, to the agitated, commanding voice. He still didn't like it.

Suddenly, it cut off. The Med Ship approached the planet to which it had been ordered by Sector Head-

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quarters now some months ago. Calhoun examined the nearing world via electron telescope. On the hemisphere rolling to a position under the Med Ship he saw a city of some size, and he could trace highways, and there were lesser human settlements here and there. At full magnification he could see where forests had been cut away in wedges and half-squares, with clear spaces between them. This indicated cultivated ground, cleared for human use in the invincibly tidy-minded manner of men.

Presently he saw the landing grid near the biggest city—that half-mile-high, cagelike wall of intricately braced steel girders. It tapped the planet's ionosphere for all the power that this world's inhabitants could use, and applied the same power to lift up and let down the ships of space by which communication with the rest of humanity was maintained. From this distance, though, even with an electron telescope, Calhoun could see no movement of any sort. There was no smoke, because electricity from the grid provided all the planet's power and heat, and there were no chimneys. The city looked like a colored map, with infinite detail but nothing which stirred.

A tiny voice spoke. It was the voice of the spaceport.

"Calling Med Ship. Grid locking on. Right?"

"Go ahead," said Calhoun. He turned up the communicator.

The voice from the ground said carefully:

"Better stand by your controls. If anything happens down here you may need to take emergency action."

Calhoun raised his eyebrows. But he said:

"All set."

He felt the cushiony, fumbling motions as force fields from the landing grid groped for the Med Ship and centered it in their complex pattern. Then there came the sudden solid feeling when the grid locked on. The Med Ship began to settle, at first slowly but with increasing speed, toward the ground below.

It was all very familiar. The shape of the continents below him were strange, but such unfamiliarity was commonplace. The voice from the ground said matter-of-factly:

"We think everything's under control, but it's hard to tell with these paras. They got away with some weather rockets last week and may have managed to mount war heads on them. They might use them on the grid, here, or try for you."

Calhoun said:

"What are paras?"

"You'll be briefed when you land," said the voice. It added: *"Everything's all right so far, though."*

The *Esclipus Twenty* went down and down and down. The grid had locked on at forty thousand miles. It was a long time before the little ship was down to thirty thousand and another long time before it was at twenty. Then more time to reach ten, and then five, and one thousand, and five hundred. When solid ground was only a hundred miles below and the curve of the horizon had to be looked for to be seen, the voice from the ground said:

"The last hundred miles is the tricky part, and the last five will be where it's tight. If anything does happen, it'll be there."

Calhoun watched through the electron telescope. He could see individual buildings now, when he used full magnification. He saw infinitesimal motes which would be ground cars on the highways. At seventy miles he cut down the magnification to keep his field of vision wide. He cut the magnification again at fifty and at thirty and at ten.

Then he saw the first sign of motion. It was an extending thread of white which could only be smoke. It began well outside the city and leaped up and curved, evidently aiming at the descending Med Ship. Calhoun said curtly:

"There's a rocket coming up. Aiming at me."

The voice from the ground said:

"It's spotted. I'm giving you free motion if you want to use it."

The feel of the ship changed. It no longer descended. The landing-grid operator was holding it aloft, but Calhoun could move it in evasive action if he wished. He approved the liberty given him. He could use his emergency rockets to dodge. A second thread of smoke came streaking upward.

Then other threads of white began just outside the landing grid. They rushed after the first. The original rockets seemed to dodge. Others came up. There was an intricate pattern formed by the smoke trails of rockets rising and other rockets following, and some trails dodging and others closing in. Calhoun carefully reminded himself that it was not likely that there'd be atomic war heads. The last planetary wars had been fought with fusion weapons, and only the crews of single ships survived. The planetary populations didn't. But atomic energy wasn't much used aground, these days. Power for planetary use could be had more easily from the upper, ionized limits of atmospheres.

A pursuing rocket closed in. There was a huge ball of smoke and a flash of light, but it was not brighter than the sun. It wasn't atomic flame. Calhoun relaxed. He watched as every one of the first-ascended rockets was tracked down and destroyed by another. The last, at that, was three-quarters of the way up.

The Med Ship quivered a little as the force fields tightened again. It descended swiftly. It came to ground. Figures came to meet Calhoun as, with Murgatroyd, he went out of the air lock. Some were uniformed. All wore the grim expression and harried look of men under long-continued strain.

The landing-grid operator shook hands first.

"Nice going! It could be lucky that you arrived. We normals need some luck!"

He introduced a man in civilian clothes as the planetary Minister for Health. A man in uniform was head

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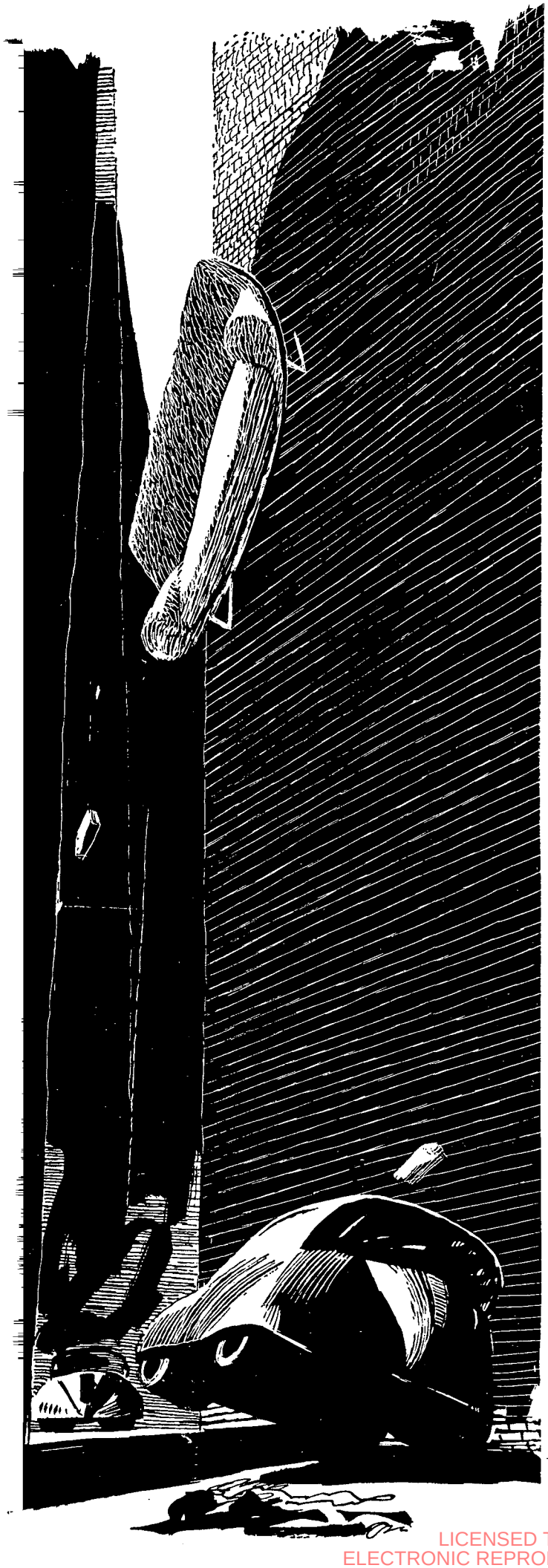

of the planetary police. The others weren't introduced.

"We worked fast after your call came!" said the grid operator. "Things are lined up for you, but they're bad!"

"I've been wondering," admitted Calhoun dryly, "if all incoming ships are greeted with rockets."

"That's the paras," said the police head, grimly. "They'd rather not have a Med Service man here."

A ground car sped across the spaceport. It came at a headlong pace toward the group just outside the Med Ship. There was the sudden howl of a siren by the spaceport gate. A second car leaped as if to intercept the first. Its siren screamed again. Then bright sparks appeared near the first car's windows. Blasters rasped. Incredulously, Calhoun saw the blue-white of blaster bolts darting toward him. The men about him clawed for weapons. The grid operator said sharply:

"Get in your ship! We'll take care of this! It's paras!"

But Calhoun stood still. It was instinct not to show alarm. Actually, he didn't feel it. This was too preposterous! He tried to grasp the situation and fearfulness does not help at such a time.

A bolt crackled against the Med Ship's hull just beyond him. Blasters rasped from beside him. A bolt exploded almost at Calhoun's feet. There were two men in the first-moving ground car, and now that another car moved to head them off, one fired desperately and the other tried to steer and fire at the same time. The siren-sounding car sent a stream of bolts at them. But both cars jounced and bounced. There could be no marksmanship under such conditions.

But a bolt did hit. The two-man car dipped suddenly to one side. Its fore part touched ground. It slued around, and its rear part lifted. It flung out its two passengers and with an effect of great deliberation it rolled over end for end and came to a stop upside down. Of its passengers, one lay still. The other struggled to his feet and began to run—toward Calhoun. He fired desperately, again and again—

Bolts from the pursuing car struck all round him. Then one struck him. He collapsed.

Calhoun's hands clenched. Automatically, he moved toward the other still figure, to act as a medical man does when somebody is hurt. The grid operator seized his arm. As Calhoun jerked to get free, that second man stirred. His blaster lifted and rasped. The little pellet of ball-lightning grazed Calhoun's side, burning away his uniform down to the skin, just as there was a grating roar of blaster fire. The second man died.

"Are you crazy?" demanded the grid operator angrily. "He was a para! He was here to try to kill you!"

The police head snapped:

"Get that car sprayed! See if it had equipment to spread contagion! Spray everything it went near! And hurry!"

There was silence as men came from the spaceport building. They pushed a tank on wheels before them. It had a hose and a nozzle attached to it. They began to use

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the hose to make a thick, foglike, heavy mist which clung to the ground and lingered there. The spray had the biting smell of phenol.

"What's going on here?" demanded Calhoun angrily. "Damnation! What's going on here?"

The Minister for Health said unhappily:

"Why . . . we've a public-health situation we haven't been able to meet. It appears to be an epidemic of . . . of . . . we're not sure what, but it looks like demoniac possession."

II

"I'd like," said Calhoun, "a definition. Just what do you mean by a para?"

Murgatroyd echoed his tone in an indignant, "*Chee-chee!*"

This was twenty minutes later. Calhoun had gone back into the Med Ship and treated the blaster burn on his side. He'd changed his clothing from the scorched uniform to civilian garb. It would not look eccentric here. Men's ordinary garments were extremely similar all over the galaxy. Women's clothes were something else.

Now he and Murgatroyd rode in a ground car with four armed men of the planetary police, plus the civilian who'd been introduced as the Minister for Health for the planet. The car sped briskly toward the spaceport gate. Masses of thick gray fog still clung to the ground where the would-be assassins' car lay on its back and where the bodies of the two dead men remained. The mist was being spread everywhere—everywhere the men had touched ground or where their car had run.

Calhoun had some experience with epidemics and emergency measures for destroying contagion. He had more confidence in the primitive sanitary value of fire. It worked, no matter how ancient the process of burning things might be. But very many human beings, these days, never saw a naked flame unless in a science class at school, where it might be shown as a spectacularly rapid reaction of oxidation. But people used electricity for heat and light and power. Mankind had moved out of the age of fire. So here on Tallien it seemed inevitable that infective material should be sprayed with antiseptics instead of simply set ablaze.

"What," repeated Calhoun doggedly, "is a para?"

The Health Minister said unhappily:

"Paras are . . . beings that once were sane men. They aren't sane any longer. Perhaps they aren't men any longer. Something has happened to them. If you'd landed a day or two later, you couldn't have landed at all. We normals had planned to blow up the landing grid so no other ship could land and be lifted off again to spread the . . . contagion to other worlds. If it is a contagion."

"Smashing the landing grid," said Calhoun practically, "may be all right as a last resort. But surely there are other things to be tried first!"

Then he stopped. The ground car in which he rode had reached the spaceport gate. Three other ground cars waited there. One swung into motion ahead of them. The other two took up positions behind. A caravan of four cars, each bristling with blast weapons, swept along the wide highway which began here at the spaceport and stretched straight across level ground toward the city whose towers showed on the horizon. The other cars formed a guard for Calhoun. He'd needed protection before, and he might need it again.

"Medically," he said to the Minister for Health, "I take it that a para is the human victim of some condition which makes him act insanely. That is pretty vague. You say it hasn't been controlled. That leaves everything very vague indeed. How widely spread is it? Geographically, I mean."

"Paras have appeared," said the Minister for Health, "at every place on Tallien Three where there are men."

"It's epidemic, then," said Calhoun professionally. "You might call it pandemic. How many cases?"

"We guess at thirty per cent of the population—so far," said the Minister for Health, hopelessly. "But every day the total goes up." He added: "Dr. Lett has some hope for a vaccine, but it will be too late for most."

Calhoun frowned. With reasonably modern medical techniques, almost any sort of infection should be stopped long before there were as many cases as that!

"When did it start? How long has it been running?"

"The first paras were examined six months ago," said the Health Minister. "It was thought to be a disease. Our best physicians examined them. They couldn't agree on a cause, they couldn't find a germ or virus . . ."

"Symptoms?" asked Calhoun crisply.

"Dr. Lett phrased them in medical terms," said the Minister for Health. "The condition begins with a period of great irritability or depression. The depression is so great that suicide is not infrequent. If that doesn't happen, there's a period of suspiciousness and secretiveness —strongly suggestive of paranoia. Then there's a craving for—unusual food. When it becomes uncontrollable, the patient is mad!"

The ground cars sped toward the city. A second group of vehicles appeared, waiting. As the four-car caravan swept up to them, one swung in front of the car in which Calhoun and Murgatroyd rode. The others fell into line to the rear. It began to look like a respectable fighting force.

"And after madness?" Calhoun asked.

"Then they're paras!" said the Health Minister. "They crave the incredible. They feed on the abominable. And they hate us normals as—devils out of hell would hate us!"

"And after that again?" said Calhoun. "I mean, what's the prognosis? Do they die or recover? If they recover, in how long? If they die, how soon?"

"They're paras!" said the Health Minister querulously. "I'm no physician! I'm an administrator! But I don't

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think any recover. Certainly none die of it! They stay—what they've become."

"My experience," said Calhoun, "has been mostly with diseases that one either recovers from or dies of. A disease whose victims organize to steal weather rockets and to use them to destroy a ship—only they failed—and who carry on with an assassination attempt . . . that doesn't sound like a disease! A disease has no purpose of its own. They had a purpose—as if they obeyed one of their number."

The Minister for Health said uneasily:

"It's been suggested—that something out of the jungle causes what's happened. On other planets there are creatures who drink blood without waking their victims. There are reptiles who sting men. There are even insects which sting men and inject diseases. Something like that seems to have come out of the jungle. While men sleep—something happens to them! They turn into paras. Something native to this world must be responsible. The planet did not welcome us. There's not a native plant or beast that is useful to us! We have to culture soil-bacteria so Earth-type plants can grow here! We don't begin to know all the creatures of the jungle! If something comes out and makes men paras without their knowledge—"

Calhoun said mildly:

"It would seem that such things could be discovered."

The Health Minister said bitterly:

"Not this thing! It is intelligent! It hides! It acts as if on a plan to destroy us! Why . . . there was a young doctor who said he'd cured a para! But we found him and the former para dead when we went to check his claim! Things from the jungle had killed them! They think! They know! They understand! They're rational, and like devils—"

A third group of ground cars appeared ahead, waiting. Like the others, they were filled with men holding blast rifles. They joined the procession—the rushing, never-pausing group of cars from the spaceport. The highway had obviously been patrolled against a possible ambush or road block. The augmented combat group went on.

"As a medical man," said Calhoun carefully, "I question the existence of a local, nonhuman rational creature. Creatures develop or adapt to fit their environment. They change or develop to fit into some niche, some special place in the ecological system which is their environment. If there is no niche and no room for a specific creature in an environment, there is no such creature there! And there cannot be a place in any environment for a creature which will change it. It would be a contradiction in terms! We rational humans change the worlds we occupy! Any rational creature will! So a rational animal is as nearly impossible as any creature can be. It's true that we've happened, but—another rational race? Oh, no!"

Murgatroyd said:

"Chee!"

The city's towers loomed higher and taller above the horizon. Then, abruptly, the fast-moving cavalcade came to the edge of the city and plunged into it.

It was not a normal city. The buildings were not eccentric. All planets, but very new ones, show local architectural peculiarities, so it was not odd to see all windows topped by triple arches, or quite useless pilasters in the brick walls of apartment buildings. These would have made the city seem only individual. But it was not normal. The streets were not clean. Two windows in three had been smashed. In places Calhoun saw doors that had been broken in and splintered, and never repaired. That implied violence unrestrained. The streets were almost empty. Occasional figures might be seen on the sidewalks before the speeding ground cars, but the vehicles never passed them. Pedestrians turned corners or dodged into doorways before the cavalcade could overtake them.

The buildings grew taller. The street level remained empty of humans, but now and again, many stories up, heads peered out of windows. Then high-pitched yellings came from aloft. It was not possible to tell whether they were yells of defiance or derision or despair, but they were directed at the racing cars.

Calhoun looked quickly at the faces of the men around him. The Minister for Health looked at once heartbroken and embittered. The head of the planetary police stared grimly ahead. Screechings and howlings echoed and re-echoed between the building walls. Objects began to fall from the windows: bottles, pots and pans. Chairs and stools twirled and spun, hurtling downward. Everything that was loose and could be thrown from a window came down, flung by the occupants of those high dwellings. With them came outcries which were assuredly cursings.

It occurred to Calhoun that there had been a period in history when mob-action invariably meant flames. Men burned what they hated and what they feared. They also burned religious offerings to divers bloodthirsty deities. It was fortunate, he reflected wryly, that fires were no longer a matter of common experience, or burning oil and flaming missiles would have been flung down on the ground cars.

"Is this unpopularity yours?" he asked. "Or do I have a share in it? Am I unwelcome to some parts of the population?"

"You're unwelcome to paras," said the police head coldly. "Paras don't want you here. Whatever drives them is afraid the Med Service might make them no longer paras. And they want to stay the way they are." His lips twisted. "They aren't making this uproar, though. We gathered everybody we were sure wasn't . . . infected into Government Center. These people were left out. We weren't sure about them. So they consider we've left them to become paras and they don't like it!"

Calhoun frowned again. This confused everything. There was talk of infection, and talk of unseen creatures come out of the jungle, making men paras and then controlling them as if by demoniac possession. There were few human vagaries, though, that were not recorded in

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the Med Service files. Calhoun remembered something, and wanted to be sick. It was like an infection, and like possession by devils, too. There would be creatures not much removed from fields involved, anyhow.

"I think," he said, "that I need to talk to your counter-para researchers. You have men working on the problem?"

"We did," said the police head, grimly. "But most of them turned para. We thought they'd be more dangerous than other paras, so we shot them. But it did no good. Paras still turn up, in Government Center, too! Now we only send paras out the south gate. They doubtless make out—as paras."

For a time there was silence in the rushing cars, though a bedlam of howls and curses came from aloft. Then a sudden shrieking of foreseen triumph came from overhead. A huge piece of furniture, a couch, seemed certain to crash into the car in which Calhoun rode. But it swerved sharply, ran up on the sidewalk, and the couch dashed itself to splinters where the car should have been. The car went down to the pavement once more and rushed on.

The street ended. A high barrier of masonry rose up at a cross street. It closed the highway and connected the walls of apartment buildings on either hand. There was a gate in it, and the leading cars drew off to one side and the car carrying Calhoun and Murgatroyd ran through, and there was a second barrier ahead, but this was closed. The other cars filed in after it, Calhoun saw that windows in these apartment buildings had all been bricked up. They made a many-storied wall shutting off all that was beyond them.

Men from the barrier went from car to car of the escort, checking the men who had been the escort for Calhoun. The Minister for Health said jerkily:

"Everybody in Government Center is examined at least once each day to see if they're turning para or not. Those showing symptoms are turned out the south gate. Everybody, myself included, has to have a fresh certificate every twenty-four hours."

The inner gate swung wide. The car carrying Calhoun went through. The buildings about them ended. They were in a huge open space that must once have been a park in the center of the city. There were structures which could not possibly be other than government buildings. But the population of this world was small. They were not grandiose. There were walkways and some temporary buildings obviously thrown hastily together to house a sudden influx of people.

And here there were many people. There was bright sunshine, and children played and women watched them. There were some—not many—men in sight, but most of them were elderly. All the young ones were uniformed and hastily going here or there. And though the children played gaily, there were few smiles to be seen on adult faces.

"I take it," said Calhoun, "that this is Government Center, where you collected everybody in the city you were sure was normal. But they don't all stay normal. And you consider that it isn't exactly an infection but the result of something that's done to them by—Something."

"Many of our doctors thought so," said the Minister for Health. "But they've turned para. Maybe the . . . Things got at them because they were close to the truth."

His head sank forward on his chest. The police head said briefly:

"When you want to go back to your ship, say so and we'll take you. If you can't do anything for us, you'll warn other planets not to send ships here."

The ground car braked before one of those square, unornamented buildings which are laboratories everywhere in the galaxy. The Minister for Health got out. Calhoun followed him, Murgatroyd riding on his shoulder. The ground car went away and Calhoun followed into the building.

There was a sentry by the door, and an officer of the police. He examined the Minister's one-day certificate of health. After various vision-phone calls, he passed Calhoun and Murgatroyd. They went a short distance and another sentry stopped them. A little farther, and another sentry.

"Tight security," said Calhoun.

"They know me," said the Minister heavily, "but they are checking my certificate that as of morning I wasn't a para."

"I've seen quarantines before," said Calhoun, "but never one like this! Not against disease!"

"It isn't against disease," said the Minister, thinly. "It's against Something intelligent . . . from the jungle . . . who chooses victims by reason for its own purposes."

Calhoun said very carefully:

"I won't deny more than the jungle."

Here the Minister for Health rapped on a door and ushered Calhoun through it. They entered a huge room filled with the complex of desks, cameras, and observing and recording instruments that the study of a living organism requires. The setup for study of dead things is quite different. Here, halfway down the room's length, there was a massive sheet of glass that divided the apartment into two. On the far side of the glass there was, obviously, an aseptic environment room now being used as an isolation chamber.

A man paced up and down beyond the glass. Calhoun knew he must be a para because he was cut off in idea and in fact from normal humanity. The air supplied to him could be heated almost white-hot and then chilled before being introduced into the aseptic chamber for him to breath, if such a thing was desired. Or the air removed could be made incandescent so no possible germ or its spores could get out. Wastes removed would be destroyed by passage through a carbon arc after innumerable previous sterilizing processes. In such rooms, centuries be-

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fore, plants had been grown from antiseptic-soaked seeds, and chicks hatched from germ-free eggs, and even small animals delivered by aseptic Caesarean section to live in an environment in which there was no living microorganism. From rooms like this men had first learned that some types of bacteria outside the human body were essential to human health. But this man was not a volunteer for such research.

He paced up and down, his hands clenching and unclenching. When Calhoun and the Minister for Health entered the outer room, he glared at them. He cursed them, though inaudibly because of the sheet of glass. He hated them hideously because they were not as he was; because they were not imprisoned behind thick glass walls through which his every action and almost his every thought could be watched. But there was more to his hatred than that. In the midst of fury so great that his face seemed almost purple, he suddenly yawned uncontrollably.

Calhoun blinked and stared. The man behind the glass wall yawned again and again. He was helpless to stop it. If such a thing could be, he was in a paroxysm of yawning, though his eyes glared and he beat his fists together. The muscles controlling the act of yawning worked independently of the rage that should have made yawning impossible. And he was ashamed, and he was infuriated, and he yawned more violently than seemed possible.

"A man's been known to dislocate his jaw, yawning like that," said Calhoun detachedly.

A bland voice spoke behind him.

"But if this man's jaw is dislocated, no one can help him. He is a para. We cannot join him."

Calhoun turned. He found himself regarded with unctuous condescension by a man wearing glittering thick eyeglasses—and a man's eyes have to be very bad if he can't wear contacts—and a uniform with a caduceus at his collar. He was plump. He was beaming. He was the only man Calhoun had so far seen on this planet whose expression was neither despair nor baffled hate and fury.

"You are Med Service," the beaming man observed zestfully. "Of the Interstellar Medical Service, to which all problems of public health may be referred! But here we have a real problem for you! A contagious madness! A transmissible delusion! An epidemic of insanity! A plague of the unspeakable!"

The Minister for Health said uneasily:

"This is Dr. Lett. He was the greatest of our physicians. Now he is nearly the last."

"Agreed," said the bland man, as zestfully as before. "But now the Interstellar Medical Service sends someone before whom I should bow! Someone whose knowledge and experience and training is so infinitely greater than mine that I become abashed! I am timid! I am hesitant to offer an opinion before a Med Service man!"

It was not unprecedented for an eminent doctor to resent the implied existence of greater skill or knowledge than his own. But this man was not only resentful. He was derisive.

"I came here," said Calhoun politely, "on what I expected to be a strictly routine visit. But I'm told there's a very grave public health situation here. I'd like to offer any help I can give."

"Grave!" Dr. Lett laughed scornfully. "It is hopeless, for poor planetary doctors like myself! But not, of course, for a Med Ship man!"

Calhoun shook his head. This man would not be easy to deal with. Tact was called for. But the situation was appalling.

"I have a question," said Calhoun ruefully. "I'm told that paras are madmen, and there's been mention of suspicion and secretiveness which suggests schizo-paranoia and—so I have guessed—the term para for those affected in this way."

"It is not any form of paranoia," said the planetary doctor, contemptuously. "Paranoia involves suspicion of everyone. Paras despise and suspect only normals. Paranoia involves a sensation of grandeur, not to be shared. Paras are friends and companions to each other. They co-operate delightedly in attempting to make normals like themselves. A paranoiac would not want anyone to share his greatness!"

Calhoun considered, and then agreed.

"Since you've said it, I see that it must be so. But my question remains. Madness involves delusions. But paras organize themselves. They make plans and take different parts in them. They act rationally for purposes they agree on—such as assassinating me. But how can they act rationally if they have delusions? What sort of delusions do they have?"

The Minister for Health said thinly:

"Only what horrors out of the jungles might suggest! I . . . I cannot listen, Dr. Lett. I cannot watch, if you intend to demonstrate!"

The man with thick glasses waved an arm. The Minister for Health went hastily out. Dr. Lett made a mirthless sound.

"He would not make a medical man! Here is a para in this aseptic room. He is an unusually good specimen for study. He was my assistant and I knew him when he was sane. Now I know him as a para. I will show you his delusion."

He went to a small culture oven and opened the door. He busied himself with something inside. Over his shoulder he said with unction:

"The first settlers here had much trouble establishing a human-use ecology on this world. The native plants and animal were useless. They had to be replaced with things compatible with humans. Then there was more trouble. There were no useful scavengers—and scavengers are essential! The rat is usually dependable, but rats do not thrive on Tallien. Vultures—no. Of course not. Carrion beetles . . . Scarabeus beetles . . . The flies that produce maggots to do such good work in refuse disposal . . .

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None thrive on Tallien Three! And scavengers are usually specialists, too. But the colony could not continue without scavengers! So our ancestors searched on other worlds, and presently they found a creature which would multiply enormously and with a fine versatility upon the wastes of our human cities. True, it smelled like an ancient Earth-animal called skunk—butyl mercaptan. It was not pretty—to most eyes it is revolting. But it was a scavenger and there was no waste product it would not devour."

Dr. Lett turned from the culture oven. He had a plastic container in his hand. A faint, disgusting odor spread from it.

"You ask what the delusions of paras may be?" he grinned derisively. He held out the container. "It is the delusion that this scavenger, this eater of unclean things, this unspeakable bit of slimy squirming flesh—paras have the delusion that it is the most delectable of foodstuffs!"

He thrust the plastic container under Calhoun's nose. Calhoun did not draw in his breath while it remained there. Dr. Lett said in mocking admiration:

"Ah! You have the strong stomach a medical man should have! The delusion of the para is that these squirming, writhing objects are delightful! Paras develop an irresistible craving for them! It is as if men on an Earth-like world develop an uncontrollable hunger for vultures and rats and—even less tolerable things. These scavengers—paras eat them! So normal men would rather die than become paras!"

Calhoun gagged in purely instinctive revulsion. The things in the plastic container were gray and small. Had they been still, they might have been no worse to look at than raw oysters in a cocktail. But they squirmed. They writhed.

"I will show you," said Dr. Lett amiably.

He turned to the glass plate which divided the room into halves. The man beyond the thick glass now pressed eagerly against it. He looked at the container with a horrible, lustful desire. The thick-eyeglassed man clucked at him, as if at a caged animal one wishes to soothe. The man beyond the glass yawned hysterically. He seemed to whimper. He could not take his eyes from the container in the doctor's hands.

"So!" said Dr. Lett.

He pressed a button. A lock-door opened. He put the container inside it. The door closed. It could be sterilized before the door on the other side would open, but now it was arranged to sterilize itself to prevent contagion from coming out.

The man behind the glass uttered inaudible cries. He was filled with beastly, uncontrollable impatience. He cried out at the mechanism of the contagion-lock as a beast might bellow at the opening through which food was dropped into its cage.

That lock opened, inside the glass-walled room. The plastic container appeared. The man leaped upon it. He gobbled its contents, and Calhoun was nauseated. But as

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the para gobbled, he glared at the two who—with Murgatroyd—watched him. He hated them with a ferocity which made veins stand out upon his temples and fury empurple his skin.

Calhoun felt that he'd gone white. He turned his eyes away and said squeamishly:

"I have never seen such a thing before."

"It is new, eh?" said Dr. Lett in a strange sort of pride. "It is new! I . . . even I! . . . have discovered something that the Med Service does not know!"

"I wouldn't say the Service doesn't know about similar things," said Calhoun slowly. "There are . . . sometimes . . . on a very small scale . . . dozens or perhaps hundreds of victims . . . there are sometimes similar irrational appetites. But on a planetary scale . . . no. There has never been a . . . an epidemic of this size."

He still looked sick and stricken. But he asked:

"What's the result of this . . . appetite? What does it do to a para? What change in . . . say . . . his health takes place in a man after he becomes a para?"

"There is no change," said Dr. Lett blandly. "They are not sick and they do not die because they are paras. The condition itself is no more abnormal than . . . than diabetes! Diabetics require insulin. Paras . . . something else. But there is prejudice against what paras need! It is as if some men would rather die than use insulin and those who did use it became outcasts! I do not say what causes this condition. I do not object if the Minister for Health believes that jungle creatures creep out and . . . make paras out of men." He watched Calhoun's expression. "Does your Med Service information agree with me?"

"No-o-o," said Calhoun. "I'm afraid it inclines to the idea of a monstrous cause, but it really isn't much like diabetes."

"But it is!" insisted Lett. "Everything digestible, no matter how unappetizing to a modern man, has been a part of the regular diet of some tribe of human savages! Even prehistoric Romans ate dormice cooked in honey! Why should the fact that a needed substance happens to be found in a scavenger . . ."

"The Romans didn't crave dormice," said Calhoun. "They could eat them or leave them alone."

The man behind the thick glass glared at the two in the outer room. He hated them intolerably. He cried out at them. Blood vessels in his temples throbbed with his hatred. He cursed them.

"I point out one thing more," said Dr. Lett. "I would like to have the co-operation of the Interstellar Medical Service. I am a citizen of this planet, and not without influence. But I would like to have my work approved by the Med Service. I submit that in some areas on ancient Earth, iodine was put into the public water-supply systems to prevent goiters and cretinism. Fluorine was put into drinking water to prevent caries. On Tralee the public water supply has traces of zinc and cobalt added. These are necessary trace elements. Why should you not concede that here there are trace elements or trace compounds needed—"

"You want me to report that," said Calhoun, flatly. "I couldn't do it without explaining—a number of things. Paras are madmen, but they organize. A symptom of privation is violent yawning. This . . . condition appeared only six months ago. This planet has been colonized for three hundred years. It could not be a naturally needed trace compound."

Dr. Lett shrugged, eloquently and contemptuously.

"Then you will not report what all this planet will certify," he said curtly. "My vaccine—"

"You would not call it a vaccine if you thought it supplied a deficiency—a special need of the people of Tallien. Could you give me a small quantity of your . . . vaccine?"

"No," said Dr. Lett blandly. "I am afraid you are not willing to be co-operative. The little of my vaccine that is available is needed for high officials, who must be protected from the para condition at all costs. I am prepared to make it on a large scale, though, for the whole population. I will see, then, that you have as much of it as you need."

Calhoun seemed to reflect.

"No," he admitted, "I'm not ready to co-operate with you, Dr. Lett. I have a very uncomfortable suspicion. I suspect that you carry a small quantity of your vaccine with you all the time. That you cannot bear the idea of being without it if you should need it. I say that because it is a symptom of other . . . similar conditions. Of other . . . abnormal appetites."

Dr. Lett had been bland and grinning in mockery. But the amusement left his face abruptly.

"Now . . . what do you mean by that?" he demanded.

Calhoun nodded his head toward the para behind the glass wall.

"That poor devil nearly yawned his head off before you gave him his diet of scavengers, Dr. Lett. Do you ever yawn like that . . . so you make sure you've always your vaccine with you to stop it? Aren't you a para, Dr. Lett? In fact, aren't you the . . . monstrous cause of . . . paras?"

Murgatroyd cried *"Chee! Chee! Chee!"* in great agitation, because Dr. Lett had snatched up a dissecting scalpel and crouched to leap upon Calhoun. But Calhoun said:

"Easy, Murgatroyd! He won't do anything regrettable!"

He had a blaster in his hand, bearing directly upon the greatest and most skillful physician on Tallien Three. And Dr. Lett did not do anything regrettable. But his eyes burned with the fury of a madman.

III

Five minutes later, or possibly ten, Calhoun went out to where the Minister for Health paced miserably up and down the corridor outside the laboratory. The Minister looked white and sick, as if despite himself he'd been pic-

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turing the demostration Lett would have given Calhoun. He did not meet Calhoun's eyes. He said uneasily:

"I'll take you to the Planetary President, now."

"No," said Calhoun. "I got some very promising information from Dr. Lett. I want to go back to my ship first."

"But the President is waiting to see you!" protested the Minister for Health. "There's something he wants to discuss!"

"I want," Calhoun observed, "to have something to discuss with him. There is intelligence back of this para business. I'd almost call it demoniac intelligence. I want to get back to my ship and check on what I got from Dr. Lett."

The Minister for Health hesitated, and then said urgently:

"But the President is extremely anxious—"

"Will you," asked Calhoun politely, "arrange for me to be taken back to my ship?"

The Minister for Health opened his mouth and closed it. Then he said apologetically—and it seemed to Calhoun—fearfully:

"Dr. Lett has been our only hope of conquering this . . . this epidemic. The President and the Cabinet felt that they had to . . . give him full authority. There was no other hope! We didn't know you'd come. So . . . Dr. Lett wished you to see the President when you left him. It won't take long!"

Calhoun said grimly:

"And he already has you scared! I begin to suspect I haven't even time to argue with you!"

"I'll get you a car and driver as soon as you've seen the President. It's only a little thing—"

Calhoun growled and moved toward the exit from the laboratory. Past the sentries. Out to the open air. Here was the wide clear space which once had been a park for the city and the site of the government buildings of Tallien Three. A little distance away, children played gaily. But there were women who watched them with deep anxiety. This particular space contained all the people considered certainly free of the para syndrome. Tall buildings surrounded the area which once had been tranquil and open to all the citizens of the planet. But now those buildings were converted into walls to shut out all but the chosen—and the chosen were no better off for having been someone's choice.

"The capital building's over yonder," said the Minister, at once urgently and affrightedly and persuasively. "It's only a very short walk! Just yonder!"

"I still," said Calhoun, "don't want to go there." He showed the Minister for Health the blaster he'd aimed at Dr. Lett only minutes ago. "This is a blaster," he said gently. "It's adjusted for low power so that it doesn't necessarily burn or kill. It's the adjustment used by police in case of riot. With luck, it only stuns. I used it on Dr. Lett," he added unemotionally. "He's a para. Did you know? The vaccine he's been giving to certain high officials to protect them against becoming para—it satisfies the monstrous appetite of paras without requiring them to eat scavengers. But it also produces that appetite. In fact, it's one of the ways by which paras are made."

The Minister for Health stared at Calhoun. His face went literally gray. He tried to speak, and could not.

Calhoun added again, as unemotionally as before:

"I left Dr. Lett unconscious in his laboratory, knocked out by a low-power blaster bolt. He knows he's a para. The President is a para, but with a supply of 'vaccine' he can deny it to himself. By the look on your face you've just found out you can't deny it to yourself any longer. You're a para, too."

The Minister for Health made an inarticulate sound. He literally wrung his hands.

"So," said Calhoun, "I want to get back to my ship and see what I can do with the 'vaccine' I took from Dr. Lett. Do you help me, or don't you?"

The Minister for Health seemed to have shriveled inside his garments. He wrung his hands again. Then a ground car braked to a stop five yards away. Two uniformed men jumped out. The first of them jerked at his blaster in its holster on his hip.

"That's the *tormal!*" he snapped. "This's the man, all right!"

Calhoun pulled the trigger of his blaster three times. It whined instead of rasping, because of its low-power setting. The Minister for Health collapsed. Before he touched ground the nearer of the two uniformed men seemed to stumble with his blaster halfway drawn. The third man toppled.

"Murgatroyd!" said Calhoun sharply.

"*Chee!*" shrilled Murgatroyd. He leaped into the ground car beside Calhoun.

The motor squealed because of the violence with which Calhoun applied the power. It went shrilly away with three limp figures left behind upon the ground. But there wouldn't be instant investigation. The atmosphere in Government Center was not exactly normal. People looked apprehensively at them. But Calhoun was out of sight before the first of them stirred.

"It's the devil," said Calhoun as he swung to the right at a roadway curve, "to have scruples! If I'd killed Lett in cold blood, I'd have been the only hope these people could have! Maybe they'd have let me help them!"

He made another turn. There were buildings here and there, and he was hardly out of sight of where he'd dropped three men. But it was astonishing that action had been taken so quickly after Lett regained consciousness. Calhoun had certainly left him not more than a quarter of an hour before. The low-power blaster must have kept him stunned for minutes. But immediately he'd recovered he'd issued orders for the capture or the killing of a man with a small animal with him, a *tormal.* And the order would have been carried out if Calhoun hadn't happen to have his own blaster actually in his hand.

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But the appalling thing was the over-all situation as now revealed. The people of Government Center were turning para and Dr. Lett had all the authority of the government behind him. He was the government for the duration of the emergency. But he'd stay the government because all the men in high office were paras who could conceal their condition only so long as Dr. Lett permitted it. Calhoun could picture the social organization to be expected. There'd be the tyrant; the absolute monarch at its head. Absolutely submissive citizens would receive their dosage of vaccine to keep them "normals" so long as it pleased their masters. Anyone who defied him or even tried to flee would become something both mad and repulsive, because subject to monstrous and irresistible appetite. And the tyrant could prevent even their satisfaction! So the citizens of Tallien Three were faced with an ultimate choice of slavery, or madness, for themselves and their families.

Calhoun swerved behind a government building and out of the parking area beyond. Obviously, he couldn't leave Government Center by the way he'd entered it. If Lett hadn't ordered him stopped, he'd be ordering it now. And Murgatroyd was an absolute identification.

Again he turned a corner, thrusting Murgatroyd down out of sight. He turned again, and again... Then he began concentratedly to remember where the sunset-line had been upon the planet when he was waiting to be landed by the grid. He could guess at an hour and a half, perhaps two, since he touched ground. On the combined data, he made a guess at the local time. It would be mid-afternoon. So shadows would lie to the northeast of the objects casting them. Then—

He did not remain on any straight roadway for more than seconds. But now when he had a choice of turnings, he had a reason for each choice. He twisted and dodged about—once he almost ran into children playing a ritual game—but the sum total of his movements was steadily southward. Paras were turned out of the south gate. That gate, alone, would be the one where someone could go out with a chance of being unchallenged.

He found the gate. The usual tall buildings bordered it to left and right. The actual exit was bare concrete walls slanting together to an exit to the outer world; no more than a house-door wide. Well back from the gate, there were four high-side trucks with armed police in the truck-bodies. They were there to make sure that paras turned out, or who went out of their own accord when they knew their state, would not come back.

He stopped the ground car and tucked Murgatroyd under his coat. He walked grimly toward the narrow exit. It was the most desperate of gambles, but it was the only one he could make. He could be killed, of course, if anybody suspected him of attempting exit at any gate.

He got out, unchallenged. The concrete walls rose higher and higher as he walked away from the trucks and the police who would surely have blasted him had they guessed. The way he could walk became narrower. It became a roofed-over passageway, with a turn in it so it could not be looked through end to end. Then—he reached open air once more.

Nothing could be less dramatic than his actual escape. He simply walked out. Nothing could be less remarkable than his arrival in the city outside of Government Center. He found himself in a city street, rather narrow, with buildings as usual all about him, whose windows were either bricked shut or smashed. There were benches against the base of one of those buildings, and four or five men, quite unarmed, lounged upon them. When Calhoun appeared one of them looked up and then arose. A second man turned to busy himself with something behind him. They were not grim. They showed no sign of being mad. But Calhoun had already realized that the appetite which was madness came only occasionally, only at intervals which could probably be known in advance. Between one monstrous hunger-spell and another, a para might look and act and actually be as sane as anybody else. Certainly Dr. Lett and the President and the Cabinet members who were paras acted convincingly as if they were not.

One of the men on the benches beckoned.

"This way," he said casually.

Murgatroyd poked his head out of Calhoun's jacket. He regarded these roughly dressed men with suspicion.

"What's that?" asked one of the five.

"A pet," said Calhoun briefly.

The statement went unchallenged. A man got up, lifting a small tank with a hose. There was a hissing sound. The spray made a fine, foglike mist. Calhoun smelled a conventional organic solvent, well-known enough.

"This's antiseptic," said the man with the spray. "In case you got some disease inside there."

The statement was plainly standard, and once it had been exquisite irony. But it had been repeated until it had no meaning any more, except to Calhoun. His clothing glittered momentarily where the spray stood on its fibres. Then it dried. There was the faintest possible residue, like a coating of impalpable dust. Calhoun guessed its significance and the knowledge was intolerable. But he said between clenched fists.

"Where do I go now?"

"Anywheres," said the first man. "Nobody'll bother you. Some normals try to keep you from getting near 'em, but you can do as you please." He added disinterestedly. "To them, too. No police out here!"

He went back to the bench and sat down. Calhoun moved on.

His inward sensations were unbearable, but he had to continue. It was not likely that instructions would have reached the para organization yet. There was one. There must be one. But eventually he would be hunted for even on the unlikely supposition that he'd gotten out of Government Center. Not yet, but presently.

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He went down the street. He came to a corner and turned it. There were again a few moving figures in sight. There might be one pedestrian in a city block. This was how they'd looked in the other part of the city, seen from a ground car. On foot, they looked the same. Windows, too, were broken. Doors smashed in. Trash on the streets . . .

None of the humans in view paid any attention to him at all, but he kept Murgatroyd out of sight regardless. Walking men who came toward him never quite arrived. They turned off on other streets or into doorways. Those who moved in the same direction never happened to be overtaken. They also turned corners or slipped into doors. They would be, Calhoun realized dispassionately, people who still considered themselves normals, out upon desperate errands for food and trying hopelessly not to take contagion back to those they got the food for. And Calhoun was shaken with a horrible rage that such things could happen. He, himself, had been sprayed with something . . . And Dr. Lett had held out a plastic container for him to smell . . . He'd held his breath then, but he could not keep from breathing now. He had a certain period of time, and that period only, before—

He forced his thoughts back to the Med Ship when it was twenty miles high, and ten, and five. He'd watched the ground through the electron telescope and he had a mental picture of the city from the sky. It was as clear to him as a map. He could orient himself. He could tell where he was.

A ground car came to a stop some distance ahead. A man got out, his arms full of bundles which would be food. Calhoun broke into a run. The man tried to get inside the doorway before Calhoun could arrive. But he would not leave any of the food.

Calhoun showed his blaster.

"I'm a para," he said quietly, "and I want this car. Give me the keys and you can keep the food."

The man groaned. Then he dropped the keys on the ground. He fled into the house.

"Thanks," said Calhoun politely to the emptiness.

He took his place in the car. He thrust Murgatroyd again out of sight.

"It's not," he told the *tormal* with a sort of despairing humor, "that I'm ashamed of you, Murgatroyd, but I'm afraid I may become ashamed of myself. Keep low!"

He started the car and drove away.

He passed through a business district, with many smashed windows. He passed through canyons formed by office buildings. He crossed a manufacturing area, in which there were many ungainly factories but no sign of any work going on. In any epidemic many men stay home from work to avoid contagion. On Tallien Three nobody would be willing to risk employment, for fear of losing much more than his life.

Then there was a wide straight highway leading away from the city but not toward the spaceport. Calhoun drove his stolen car along it. He saw the strange steel embroidery of the landing grid rising to the height of a minor mountain against the sky. He drove furiously. Beyond it. He had seen the highway system from twenty miles height, and ten, and five. From somewhere near here stolen weather rockets had gone billowing skyward with explosive war heads to shatter *Esclipus Twenty*.

They'd failed. Now Calhoun went past the place from which they had been launched, and did not notice. Once he could look across flat fields and see the spaceport highway. It was empty. Then there was sunset. He saw the topmost silvery beams and girders of the landing grid still glowing in sushine which no longer reached down to the planet's solid ground.

He drove. And drove. Government Center might put a road block to the spaceport, just in case. But they'd really believe him still hiding somewhere in Government Center with no hope of—actually—accomplishing anything but his own destruction.

After sunset he was miles beyond the spaceport. When twilight was done, he'd crossed to another surface road and was headed back toward the city. But this time he would pass close to the spaceport. And two hours after sundown he turned the car's running-lights off and drove a dark and nearly noiseless vehicle through deep-fallen night. Even so, he left the ground car a mile from the tall and looming lacework of steel. He listened with straining ears for a long time.

Presently he and Murgatroyd approached the spaceport, on foot, from a rather improbable direction. The gigantic, unsubstantial tower rose incredibly far toward the sky. As he drew near it he crouched lower and lower so he was almost crawling to keep from being silhouetted against the stars. He saw lights in the windows of the grid's control building. As he looked, a lighted window darkened from someone moving past it inside. There was an enormous stillness, broken only by faint, faint noises of the wind in the metal skeleton.

He saw no ground cars to indicate men brought here and waiting for him. He went very cautiously forward. Once he stopped and distastefully restored his blaster to lethal-charge intensity. If he had to use it, he couldn't hope to shoot accurately enough to stun an antagonist. He'd have to fight for his life—or rather, for the chance to live as a normal man, and to restore that possibility to the people in the ghastly-quiet city at the horizon and the other lesser cities elsewhere on this world.

He took infinite precautions. He saw the Med Ship standing valiantly upright on its landing fins. It was a relief to see it. The grid operator could have been ordered to lift it out to space—thrown away to nowhere, or put in orbit until it was wanted again, or . . .

That was still a possibility. Calhoun's expression turned wry. He'd have to do something about the grid. He must be able to take off on the ship's emergency rockets without the risk of being caught by the tremendously powerful force fields by which ships were launched and landed.

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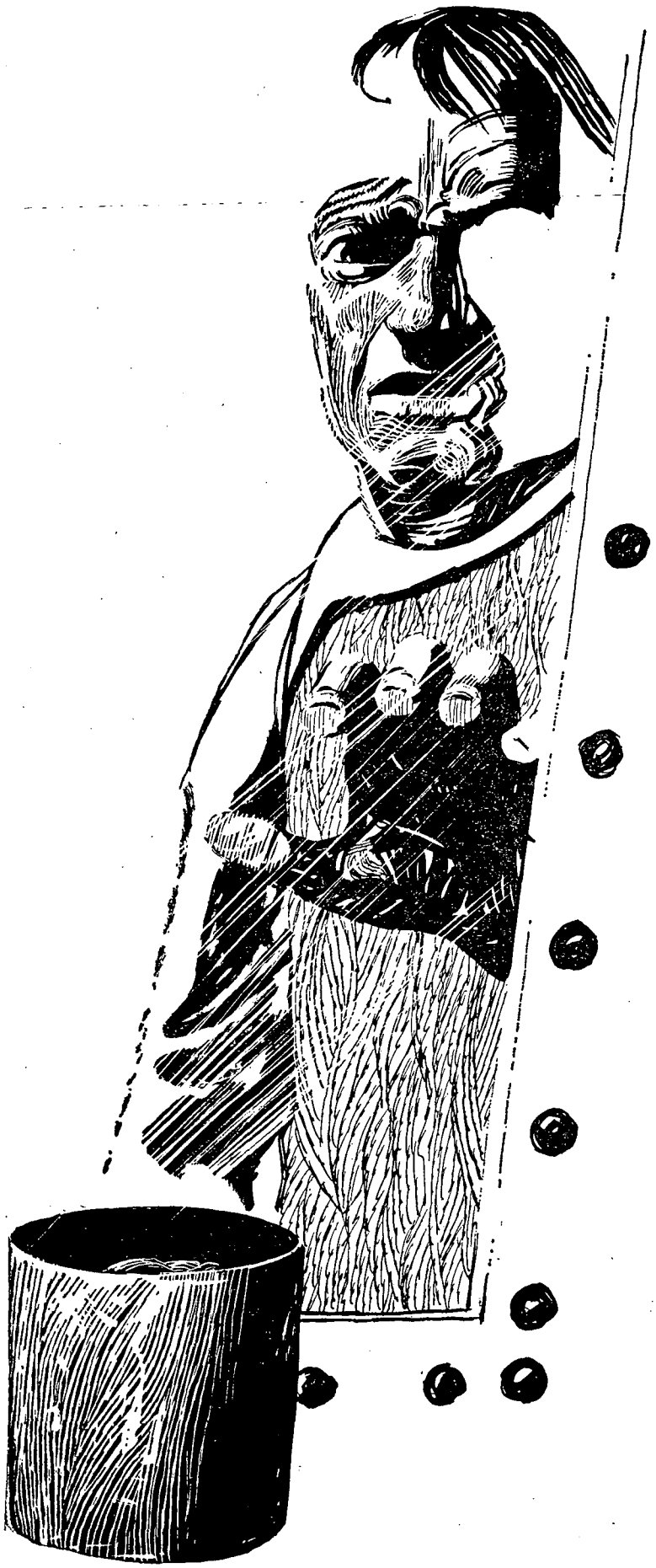

He crept close to the control building. No voices, but there was movement inside. Presently he peered in a window.

The grid operator who'd been the first man to greet him on his landing, now moved about the interior of the building. He pushed a tank on wheels. With a hose attached to it, he sprayed. Mist poured out and splashed away from the side walls. It hung in the air and settled on the desks, the chairs, and on the control board with its dials and switches. Calhoun had seen the mist before. It had been used to spray instead of burning the bodies of the two men who'd tried to murder him, and their wrecked ground car, and everywhere that the car was known to have run. It was a decontaminant spray; credited with the ability to destroy the contagion that made paras out of men.

Calhoun saw the grid operator's face. It was resolute beyond expression, but it was very, very bitter.

Calhoun went confidently to the door and knocked on it. A savage voice inside said:

"Go away! I just found out I'm a para!"

Calhoun opened the door and walked inside. Murgatroyd followed. He sneezed as the mist reached his nostrils.

"I've been treated," said Calhoun, "so I'll be a para right along with you, after whatever the development period is. Question: Can you fix the controls so nobody else can use the grid?"

The grid operator stared at him numbly. He was deathly pale. He did not seem able to grasp what Calhoun had said.

"I've got to do some work on the para condition," Calhoun told him. "I need to be undisturbed in the ship, and I need a patient further along toward being a para than I am. It'll save time. If you'll help, we may be able to beat the thing. If not, I've still got to disable the grid."

The grid operator said in a savage, unhuman voice:

"I'm a para. I'm trying to spray everything I've touched. Then I'm going to go off somewhere and kill myself—"

Calhoun drew his blaster. He adjusted it again to nonlethal intensity.

"Good man!" he said approvingly. "I'll have a similar job to do if I'm not a better medical man than Lett! Will you help me?"

Murgatroyd sneezed again. He said plaintively:

"*Chee!*"

The grid operator looked down at him, obviously in a state of shock. No ordinary sight or sound could have gotten through to his consciousness. But Murgatroyd was a small, furry animal with long whiskers and a hirsute tail and a habit of imitating the actions of humans. He sneezed yet again and looked up. There was a handkerchief in Calhoun's pocket. Murgatroyd dragged it out and held it to his face. He sneezed once more and said, "*Chee!*" and returned the handkerchief to its place. He

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regarded the grid operator disapprovingly. The operator was shocked out of his despair. He said shakenly:

"What the devil—" Then he stared at Calhoun. "Help you? How can I help anybody? I'm a para!"

"Which," said Calhoun, "is just what I need. I'm Med Service, man! I've got a job to do with what they call an epidemic! I need a para who's willing to be cured! That's you! Let's get this grid fixed so it can't work and—"

There was a succession of loud clicks from a speaker-unit on the wall. It was an emergency-wave, unlocking the speaker from its Off position. Then a voice:

"All citizens attention! The Planetary President is about to give you good news about the end of the para epidemic!"

A pause. Then a grave and trembling voice came out of the speaker:

"My fellow-citizens, I have the happiness to report that a vaccine completely protecting normals against the para condition, and curing those already paras, has been developed. Dr. Lett, of the planetary health service, has produced the vaccine which is already in small-scale production and will shortly be available in large quantities, enough for everyone! The epidemic which has threatened every person on Tallien Three is about to end! And to hasten the time when every person on the planet will have the vaccine in the required dosage and at the required intervals, Dr. Lett has been given complete emergency authority. He is empowered to call upon every citizen for any labor, any sum, any sacrifice that will restore our afflicted fellow-citizens to normality, and to protect the rest against falling a victim to this intolerable disease. I repeat; a vaccine has been found which absolutely prevents anyone from becoming a para, and which cures those who are paras now. And Dr. Lett has absolute authority to issue any orders he feels necessary to hasten the end of the epidemic and to prevent its return. But the end is sure!"

The speaker clicked off. Calhoun said wryly:

"Unfortunately, I know what that means. The President has announced the government's abdication in favor of Dr. Lett, and that the punishment for disobeying Lett is—madness."

He drew a deep breath and shrugged his shoulders.

"Come along! Let's get to work!"

IV

As it happened, the timing was critical, though Calhoun hadn't realized it. There were moving lights on the highway to the city at the moment Calhoun and the grid operator went into the Med Ship and closed the air-lock door behind them. The lights drew nearer. They raced. Then ground cars came rushing through the gate of the spaceport and flung themselves toward the wholly peaceful little Med Ship where it stood seeming to yearn toward the sky. In seconds they had it ringed about, and armed men were trying to get inside. But Med Ships land on very many planets, with very many degrees of respect for the Interstellar Medical Service. On some worlds there is great integrity displayed by spaceport personnel and visitors. On others there is pilfering, or worse. So Med Ships are not easily broken into.

They spent long minutes fumbling unskillfully at the outer air-lock door. Then they gave it up. Two car loads of men went over to the control building, which now was dark and silent. Its door was not locked. They went in.

There was consternation. The interior of the control building reeked of antiseptic spray—the spray used when a para was discovered. In some cases, the spray a para used when he discovered himself. But it was not reassuring to the men just arrived from Government Center. Instead of certifying to their safety, it told of horrifying danger. Because despite a broadcast by the planetary president, terror of paras was too well-established to be cured by an official statement.

The men who'd entered the building stumbled out and stammered of what they'd smelled inside the building. Their companions drew back, frightened by even so indirect a contact with supposed contagion. They stayed outside, while a man who hadn't entered used the police-car's communicator to report to the headquarters of the planetary police.

The attempt to enter the ship was known inside, of course. But Calhoun paid no attention. He emptied the pockets of the garments he'd worn into the city. There were the usual trivia a man carries with him. But there was also a blaster—set for lower-power bolts—and a small thick-glass phial of a singular grayish fluid, and a plastic container.

He was changing to other clothing when he heard the muttering report, picked up by a ship-receiver tuned to planetary police wave length. It reported affrightedly that the Med Ship could not be entered, and the grid's control building was dark and empty and sprayed as if to destroy contagion. The operator was gone.

Another voice snapped orders in reply. The highest authority had given instructions that the Med Ship man now somewhere in the capitol city must be captured, and his escape from the planet must be prevented at all costs. So if the ship itself could not be entered and disabled, get the grid working and throw it away. Throw it out to space! Whether there was contagion in the control building or not, the ship must be made unusable to the Med Ship man!

"They think well of me," said Calhoun. "I hope I'm as dangerous as Dr. Lett now believes." Then he said crisply: "You say you're a para. I want the symptoms; how you feel and where. Then I want to know your last contact with scavengers."

The intentions of the police outside could be ignored. It wouldn't matter if the Med Ship were heaved out to

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space and abandoned. He was in it. But it couldn't happen. The grid operator had brought away certain essential small parts of the grid control system. Of course the ship could be blown up. But he'd have warning of that. He was safe except for one thing. He'd been exposed to whatever it was that made a man a para. The condition would develop. But he did have a thick-glass container of grayish fluid, and he had a plastic biological-specimen container. One came from Dr. Lett's safest pocket. It would be vaccine. The other came from the culture oven in the doctor's laboratory.

The thick-glass phial was simply that. Calhoun removed the cover from the other. It contained small and horrible squirming organisms, writhing in what was probably a nutrient fluid to which they could reduce human refuse. They swam jerkily in it so that the liquid seemed to seethe. It smelled. Like skunk.

The grid operator clenched his hands.

"Put it away!" he commanded fiercely. "Out of sight! Away!"

Calhoun nodded. He locked it in a small chest. As he put down the cover he said in an indescribable tone:

"It doesn't smell as bad to me as it did."

But his hands were steady as he drew a sample of a few drops from the vaccine bottle. He lowered a wall panel and behind it there was a minute but astonishingly complete biological laboratory. It was designed for microanalysis—the quantitative and qualitative analysis of tiny quantities of matter. He swung out a miniaturized Challis fractionator. He inserted half a droplet of the supposed vaccine and plugged in the fractionator's power cable. It began to hum.

The grid operator ground his teeth.

"This is a fractionator," said Calhoun. "It spins a biological sample through a chromatograph gele."

The small device hummed more shrilly. The sound rose in pitch until it was a whine, and then a whistle, and then went up above the highest pitch to which human ears are sensitive. Murgatroyd scratched at his ears and complained:

"Chee! Chee! Chee!"

"It won't be long," Calhoun assured him. He looked once at the grid operator and then looked away. There was sweat on the man's forehead. Calhoun said casually: "The substance that makes the vaccine do what it does do is in the vaccine, obviously. So the fractionator is separating the different substances that are mixed together." He added, "It doesn't look much like chromatography, but the principle's the same. It's an old, old trick!"

It was, of course. That different dissolved substances can be separated by their different rates of diffusion through wetted powders and geles had been known since the early twentieth century, but was largely forgotten because not often needed. But the Med Service did not abandon processes solely because they were not new.

Calhoun took another droplet of the vaccine and put it between two plates of glass, to spread out. He separated them and put them in a vacuum drier.

"I'm not going to try an analysis," he observed. "It would be silly to try to do anything so complicated if I only need to identify something. Which I hope is all I do need!"

He brought out an extremely small vacuum device. He cleaned the garments he'd just removed, drawing every particle of dust from them. The dust appeared in a transparent tube which was part of the machine.

"I was sprayed with something I suspect the worst of," he added. "The spray left dust behind. I *think* it made sure that anybody who left Government Center would surely be a para. It's another reason for haste."

The grid operator ground his teeth again. He did not really hear Calhoun. He was deep in a private hell of shame and horror.

The inside of the ship was quiet, but it was not tranquil. Calhoun worked calmly enough, but there were times when his inwards seemed to knot and cramp him, which was not the result of any infection or contagion or demoniac possession, but was reaction to thoughts of the imprisoned para in the laboratory. That man had gobbled the unspeakable because he could not help himself, but he was mad with rage and shame over what he had become. Calhoun could become like that—

The loud-speaker tuned to outside frequencies muttered again. Calhoun turned up its volume.

"Calling Headquarters!" panted a voice. "There's a mob of paras forming in the streets in the Mooreton quarter! They're raging! They heard the President's speech and they swear they'll kill him! They won't stand for a cure! Everybody's got to turn para! They won't have normals on the planet! Everybody's got to turn para or be killed!"

The grid operator looked up at the speaker. The ultimate of bitterness appeared on his face. He saw Calhoun's eyes on him and said savagely:

"That's where I belong!"

Murgatroyd headed straight for his cubbyhole and crawled into it.

Calhoun got out a microscope. He examined the dried glass plates from the vacuum drier. The fractionator turned itself off and he focused on and studied the slide it yielded. He inspected a sample of the dust he'd gotten from the garments that had been sprayed at the south gate. The dust contained common dust particles and pollen particles and thread particles and all sorts of microscopic debris. But throughout all the sample he saw certain infinitely tiny crystals. They were too small to be seen separately by the naked eye, but they had a definite crystalline form. And the kind of crystals a substance makes are not too specific about what the substance is, but they tell a great deal about what it cannot be. In the fractionator slide he could get more information—the rate-of-diffusion of a substance in solution ruled out all

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but a certain number of compounds that it could be. The two items together gave a definite clue.

Another voice from the speaker:

"Headquarters! Paras are massing by the north gate! They act ugly! They're trying to force their way into Government Center! We'll have to start shooting if we're to stop them! What are our orders?"

The grid operator said dully:

"They'll wreck everything. I don't want to live because I'm a para, but I haven't acted like one yet. Not yet! But they have! So they don't want to be cured! They'd never forget what they've done. They'd be ashamed!"

Calhoun punched keys on a very small computer. He'd gotten an index-of-refraction reading on crystals too small to be seen except through a microscope. That information, plus specific gravity, plus crystalline form, plus rate of diffusion in a fractionator, went to the stores of information in the computer's memory banks somewhere between the ship's living quarters and its outer skin.

A voice boomed from another speaker, tuned to public-broadcast frequency:

"My fellow-citizens, I appeal to you to be calm! I beg you to be patient! Practice the self-control that citizens owe to themselves and their world. I appeal to you . . ."

Outside in the starlight the Med Ship rested peacefully on the ground. Around and above it the grid rose like geometric fantasy to veil most of the starry sky. Here in the starlight the ground-car communicators gave out the same voice. The same message. The President of Tallien Three made a speech. Earlier, he'd made another. Earlier still he'd taken orders from the man who was already absolute master of the population of this planet.

Police stood uneasy guard about the Med Ship because they could not enter it. Some of their number who had entered the control building now stood shivering outside it, unable to force themselves inside again. There was a vast, detached stillness about the spaceport. It seemed the more unearthly because of the thin music of wind in the landing-grid's upper levels.

At the horizon there was a faint glow. Street lights still burned in the planet's capitol city, but though buildings rose against the sky no lights burned in them. It was not wise for anybody to burn lights that could be seen outside their dwellings. There were police, to be sure. But they were all in Government Center, marshaled there to try to hold a perimeter formed by bricked-up apartment buildings. But most of the city was dark and terribly empty save for mobs of all sizes but all raging. Nine-tenths of the city was at the mercy of the paras. Families darkened their homes and, terrified, hid in corners and in closets, listening for outcries or the thunderous tramping of madmen at their doors.

In the Med Ship the loud-speaker went on:

"I have told you," said the rounded tones of the Planetary President—but his voice shook, *"I have told you that Dr. Lett has perfected and is making a vaccine which will protect every citizen and cure every para. You must believe me, my fellow-citizens. You must believe me! To paras, I promise that their fellows who were not afflicted with the same condition will forget! I promise that no one will remember what . . . what has been done in delirium! What has taken place—and there have been tragedies—will be blotted out. Only be patient now! Only . . ."*

Calhoun went over his glass slides again while the computer stood motionless, apparently without life. But he had called for it to find, in its memory banks, an organic compound of such-and-such a crystalline form, such-and-such a diffusion rate, such-and-such a specific gravity, and such-and-such a refractive index. Men no longer considered that there was any effective limit to the number of organic compounds that were possible. The old guess at half a million different substances was long exceeded. It took time even for a computer to search all its microfilmed memories for a compound such as Calhoun had described.

He paced restlessly while the computer consulted its memory with faint whirrings of cooling blowers, and occasional chucklings as memory cubes full of exceedingly complex stereomolecules of recorded information were searched.

"Maybe," Calhoun said, "this isn't so much a new disease as a modification of a very old one. The very ancient Hate Disease—for the most important symptom of this particular malady is the hate it's stirred up. I've seen a number of sick planets—but the hate index on this one earns it a record score." He paused for a moment as the computer did an extra-special burping chuckle, and slipped in an entire new case of memory cubes. "Hm-m-m . . . if what we're looking for is a vaccine against hate we'd really have something.

"But I'm afraid not. That's too happy an outcome. We'll just call this Hate Disease, Tallien Three strain. It's standard practice," Calhoun continued, "to consider that everything that can happen, does. Specifically, that any compound that can possibly exist, sooner or later must be formed in nature. We're looking for a particular one. It must have been formed naturally at some time or another, but never before has it appeared in quantity enough to threaten a civilization. Why?"

Murgatroyd licked his right-hand whiskers. He whimpered a little—and Murgatroyd was a very cheerful small animal, possessed of exuberant health and a fine zest in simply being alive. Exposed to contagion, it was the admirable talent of his kind to react instantly and violently, producing antibodies so promptly that no conceivable disease could develop. *Tormals* were cherished and respected members of the Interstellar Medical Service because they could produce within hours antibodies for any possible infection, and the synthesis of such antibodies could be begun and any possible plague defeated. But Murgatroyd was not happy now.

"It's been known for a long time," said Calhoun im-

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patiently, "that no life form exists alone. Every living creature exists in an environment, in association with all the other living creatures around it. But this is true of compounds, too! Anything that is part of an environment is essential to that environment. So even organic compounds are as much parts of a planetary life system as . . . say . . . rabbits on a Terran type world. If there are no predators, rabbits will multiply until they starve."

Murgatroyd said, "*Chee!*" as if complaining to himself.

"Rats," said Calhoun somehow angrily, "have been known to do that on a derelict ship. There was a man named Malthus who said we humans would some day do the same thing. But we haven't. We've taken over a galaxy. If we ever crowd this, there are more galaxies for us to colonize, forever! But there have been cases of rats and rabbits multiplying past endurance. Here we've got an organic molecule that has multiplied out of all reason! It's normal for it to exist, but in a normal environment it's held in check by other molecules which in some sense feed on it; which control the population of this kind of molecule as rabbits or rats are controlled in a larger environment. But the check on this molecule isn't working, here!"

The booming voice of the Planetary President went on and on and on. Memoranda of events taking place were handed to him, and he read them and argued with the paras who had tried to rush the north gate of Government Center, to make its inhabitants paras like themselves. But the Planetary President tried to make oratory a weapon against madness.

Calhoun grimaced at the voice. He said fretfully:

"There's a molecule which has to exist because it can. It's a part of a normal environment, but it doesn't normally produce paras. Now it does! Why? What is the compound or the condition that controls its abundance? Why is it missing here? What is lacking? What?"

The police-frequency speaker suddenly rattled, as if someone shouted into a microphone.

"*All police cars! Paras have broken through a building wall on the west side! They're pouring into the Center! All cars rush! Set blasters at full power and use them! Drive them back or kill them!*"

The grid operator turned angry, bitter eyes upon Calhoun.

"The paras—we paras!—don't want to be cured!" he said fiercely. "Who'd want to be normal again and remember when he ate scavengers? I haven't yet, but—who'd be able to talk to a man he knew had devoured . . . devoured—" The grid operator swallowed. "We paras want everybody to be like us, so we can endure being what we are! We can't take it any other way—except by dying!"

He stood up. He reached for the blaster Calhoun had put aside when he changed from the clothes he'd worn in the city.

". . . And I'll take it that way!"

Calhoun whirled. His fist snapped out. The grid operator reeled back. The blaster dropped from his hand. Murgatroyd cried out shrilly, from his cubbyhole. He hated violence, did Murgatroyd.

Calhoun stood over the operator, raging:

"It's not that bad yet! You haven't yawned once! You can stand the need for monstrousness for a long while yet! And I need you!"

He turned away. The President's voice boomed. It cut off abruptly. Another voice took its place. And this was the bland and unctuous voice of Dr. Lett.

"*My friends! I am Dr. Lett! I have been entrusted with all the powers of the government because I, and I alone, have all power over the cause of the para condition. From this moment I am the government! To paras—you need not be cured unless you choose. There will be places and free supplies for you to enjoy the deep satisfactions known only to you! To nonparas—you will be protected from becoming paras except by your own choice. In return, you will obey! The price of protection is obedience. The penalty for disobedience will be loss of protection. But those from whom protection is withdrawn will not be supplied with their necessities! Paras, you will remember this! Nonparas, do not forget it!*" His voice changed. "*Now I give an order! To the police and to nonparas: You will no longer resist paras! To paras: You will enter Government Center quietly and peacefully. You will not molest the nonparas you come upon. I begin at once the organization of a new social system in which paras and nonparas must co-operate. There must be obedience to the utmost—*"

The grid operator cursed as he rose from the floor. Calhoun did not notice. The computer had finally delivered a strip of paper on which was the answer he had demanded. And it was of no use. Calhoun said tonelessly:

"Turn that off, will you?"

While the grid operator obeyed, Calhoun read and reread the strip of tape. He had lacked something of good color before, but as he reread, he grew paler and paler. Murgatroyd got down restlessly from his cubbyhole. He sniffed. He went toward the small locked chest in which Calhoun had put away the plastic container of living scavengers. He put his nose to the crack of that chest's cover.

"*Chee!*" he said confidently. He looked at Calhoun. Calhoun did not notice.

"This," said Calhoun, completely white. "This is bad! It's . . . it's an answer, but it would take time to work it out, and we haven't got the time! And to make it and to distribute it—"

The grid operator growled. Dr. Lett's broadcast had verified everything Calhoun said. Dr. Lett was now the government of Tallien Three. There was nobody who could dare to oppose him. He could make anybody into a para, and then deny that para his unspeakable necessi-

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ties. He could turn anybody on the planet into a madman with ferocious and intolerable appetites, and then deny them their satisfaction. The people of Tallien Three were the slaves of Dr. Lett. The grid operator said in a deadly voice:

"Maybe I can get to him and kill him before—"

Calhoun shook his head. Then he saw Murgatroyd sniffing at the chest now holding the container of live scavengers. Open, it had had a faint but utterly disgusting odor. Locked up, Calhoun could not smell it. But Murgatroyd could. He sniffed. He said impatiently to Calhoun:

"*Chee! Chee-chee!*"

Calhoun stared. His lips tightened. It was the function of the *tormal* members of the Med Service to react to any infection more swiftly than humans could do, and to develop antibodies which destroyed that infection and could be synthesized to cure it in humans. But Murgatroyd was immune only to infections. To toxins. He was not immune to an appetite-causing molecule demanding more of itself on penalty of madness. Murgatroyd had no more inherent resistance than a man.

"*Chee-chee!*" he chattered urgently. "*Chee-chee-chee!*"

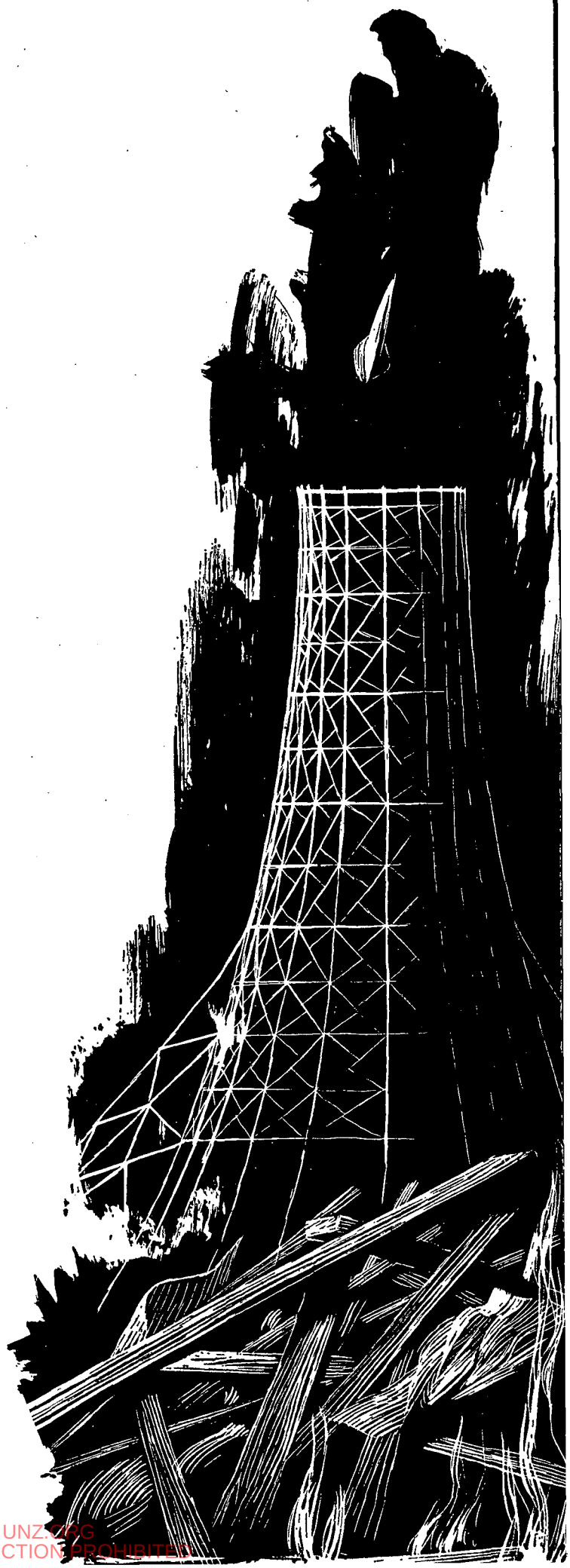
"It's got him," said Calhoun. He felt sickened. "It'll have me. Because I can't synthesize anything as complex as the computer says is needed to control the molecular population that makes paras!"

Murgatroyd chattered again. He was indignant. He wanted something and Calhoun didn't give it to him. He could not understand so preposterous a happening. He reached up and tugged at Calhoun's trouser-leg. Calhoun picked him up and tossed him the width of the control room. He'd done it often, in play, but this was somehow different. Murgatroyd stared incredulously at Calhoun.

"To break it down," said Calhoun bitterly, "I need aromatic olefines and some acetone, and acetic-acid radicals and methyl submolecular groups. To destroy it absolutely I need available unsaturated hydrocarbons —they'll be gases! And it has to be kept from reforming as it's broken up, and I may need twenty different organic radicals available at the same time! It's a month's work for a dozen competent men just to find out how to make it, and I'd have to make it in quantity for millions of people and persuade them of its necessity against all the authority of the government and the hatred of the paras, and then distribute it—"

Murgatroyd was upset. He wanted somthing that Calhoun wouldn't give him. Calhoun had shown impatience —almost an unheard-of thing! Murgatroyd squirmed unhappily. He still wanted the thing in the chest. But if he did something ingratiating . . .

He saw the blaster, lying on the floor. Calhoun often petted him when, imitating, he picked up something that had been dropped. Murgatroyd went over to the blaster. He looked back at Calhoun. Calhoun paced irritibly up and down. The grid operator stood with clenched hands, contemplating the intolerable and the monstrous.



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Murgatroyd picked up the blaster. He trotted over to Calhoun. He plucked at the man's trouser-leg again. He held the blaster in the only way his tiny paw could manage it. A dark, sharp-nailed finger rested on the trigger.

"Chee-chee!" said Murgatroyd.

He offered the blaster. Calhoun jumped when he saw it in Murgatroyd's paw. The blaster jerked, and Murgatroyd's paw tightened to hold it. He pulled the trigger. A blaster-bolt crashed out of the barrel. It was a miniature bolt of ball-lightning. It went into the floor, vaporizing the surface and carbonizing the multi-ply wood layer beneath it. The Med Ship suddenly reeked of wood smoke and surfacer. Murgatroyd fled in panic to his cubbyhole and cowered in its farthest corner.

But there was a singular silence in the Med Ship. Calhoun's expression was startled; amazed. He was speechless for long seconds. Then he said blankly:

"Damnation! How much of a fool can a man make of himself when he works at it? Do you smell that?" He shot the question at the grid operator. "Do you smell that? It's wood smoke! Did you know it?"

Murgatroyd listened fearfully, blinking.

"Wood smoke!" said Calhoun between his teeth. "And I didn't see it! Men have had fires for two million years and electricity for half a thousand. For two million years there was no man or woman or child who went a full day without breathing in some wood smoke! And I didn't realize that it was so normal a part of human environment that it was a necessary one!"

There was a crash. Calhoun had smashed a chair. It was an oddity because it was made of wood. Calhoun had owned it because it was odd. Now he smashed it to splinters and piled them up and flung blaster-bolt after blaster-bolt into the heap. The air inside the Med Ship grew pungent; stinging; strangling. Murgatroyd sneezed. Calhoun coughed. The grid operator seemed about to choke. But in the white fog Calhoun cried exultantly:

"Aromatic olefines! Acetone! Acetic acid radicals and methyl submolecular groups! And smoke has unsaturated hydrocarbon gases. This is the stuff our ancestors have breathed in tiny quantities for a hundred thousand generations! Of course it was essential to them! And to us! It was a part of their environment, so they had to have a use for it! And it controlled the population of certain molecules . . ."

The air system gradually cleared away the smoke, but the Med Ship still reeked of wood-smoke smells.

"Let's check on this thing!" snapped Calhoun. "Murgatroyd!"

Murgatroyd came timidly to the door of his cubbyhole. He blinked imploringly at Calhoun. At a repeated command he came unhappily to his master. Calhoun petted him. Then he opened the chest in which a container held living scavengers which writhed and swam and seemed to seethe. He took out that container. He took off the lid.

Murgatroyd backed away. His expression was ludicrous. There was no question but that his nose was grievously offended. Calhoun turned to the grid operator. He extended the sample of scavengers. The grid man clenched his teeth and took it. Then his face worked. He thrust it back into Calhoun's hand.

"It's—horrible!" he said thickly. "Horrible!" Then his jaw dropped. "I'm not a para! Not . . . a para—" Then he said fiercely. "We've got to get this thing started! We've go to start curing paras—"

"Who," said Calhoun, "will be ashamed of what they remember. We can't get co-operation from them! And we can't get co-operation from the government! The men who were the government are paras and they've given their authority to Dr. Lett. You don't think he'll abdicate, do you? Especially when it's realized that he was the man who developed the strain of scavengers that secrete this modified butyl mercaptan that turns men into paras!"

Calhoun grinned almost hysterically.

"Maybe it was an accident. Maybe he found himself the first para and was completely astonished. But he couldn't be alone in what he knew was—degradation. He wanted others with him in that ghastly state. He got them. Then he didn't want anybody not to be like himself . . . We can't get help from him!"

Exultantly, he flipped switches to show on vision screens what went on in the world outside the ship. He turned on all the receivers that could pick up sounds and broadcasts. Voices came in:

"There's fighting everywhere! Normals won't accept paras among them! Paras won't leave normals alone . . . They touch them; breathe on them—and laugh! There's fighting—" The notion that the para state was contagious was still cherished by paras. It was to be preferred to the notion that they were possessed by devils. But there were some who gloried in the more dramatic opinion. There were screamings on the air, suddenly, and a man's voice panting: *"Send police here fast! The paras have gone wild. They're—"*

Calhoun seated himself at the control desk. He threw switches there. He momentarily touched a button. There was a slight shock and the beginning of a roar outside. It cut off. Calhoun looked at the vision plates showing outside. There was swirling smoke and steam. There were men running in headlong flight, leaving their ground cars behind them.

"A slight touch of emergency rocket," said Calhoun. "They've run away. Now we end the plague on Tallien Three."

The grid operator was still dazed by the continued absence of any indication that he might ever become a para. He said unsteadily:

"Sure! Sure! But how?"

"Wood smoke," said Calhoun. "Emergency rockets. Roofs! There's been no wood smoke in the air on this planet because there are no forest fires and people don't

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burn fuel. They use electricity. So we start the largest production of wood smoke that we find convenient, and the population of a certain modified butyl mercaptan molecule will be reduced. Down to a normal level. Immediately!"

The emergency rocket bellowed thunderously and the little Med Ship rose.

There have been, of course, emergency measures against contagion all through human history. There was a king of France, on Earth, who had all the lepers in his kingdom killed. There have been ships and houses burned to drive out plague, and quarantines which simply interfered with human beings were countless. Calhoun's measure on Tallien was somewhat more drastic than most, but it had good justification.

He set fire to the planet's capitol city. The little Med Ship swept over the darkened buildings. Her emergency rockets made thin pencils of flame two hundred feet long. She touched off roofs to the east, and Calhoun rose to see which way the wind blew. He descended and touched here and there . . .

Thick, seemingly suffocating masses of wood smoke flowed over the city. They were not actually strangling, but they created panic. There was fighting in Government Center, but it stopped when the mysterious stuff—not one man in a hundred had ever seen burning wood or smelled its smoke—the fighting stopped and all men fled when a choking, reeking blanket rolled over the city and lay there.

It wasn't a great fire, considering everything. Less than ten per cent of the city burned, but ninety-odd per cent of the paras in it ceased to be paras. More, they had suddenly regained an invincible aversion to the smell of butyl mercaptan—even a modified butyl mercaptan—and it was promptly discovered that no normal who had smelled wood smoke became a para. So all the towns and even individual farmhouses would hereafter make sure that there was pungent wood smoke to be smelled from time to time by everybody.

But Calhoun did not wait for such pleasant news. He could not look for gratitude. He'd burned part of a city. He'd forced paras to stop being paras and become ashamed. And those who hadn't become paras wanted desperately to forget the whole matter as soon as possible. They couldn't, but gratitude to Calhoun would remind them. He took appropriate action.

With the grid operator landed again, and after the grid was operable once more and had sent the Med Ship a good five planetary diameters into space—some few hours after the ship was in overdrive again—Calhoun and Murgatroyd had coffee together. Murgatroyd zestfully licked his emptied tiny mug, to get the last least taste of the beverage. He said happily, *"Chee!"* He wanted more.

"Coffee," said Calhoun severely, "has become a habit with you, Murgatroyd! If this abnormal appetite develops too far, you might start yawning at me, which would imply that your desire for it was uncontrollable. A yawn caused by what is called a yen has been known to make a man dislocate his jaw. You might do that. You wouldn't like it!"

Murgatroyd did not reply.

"You don't believe it, eh?" said Calhoun. Then he said: "Murgatroyd, I'm going to spend odd moments all the rest of my life wondering about what happens to Dr. Lett! They'll kill him, somehow. But I suspect they'll be quite gentle with him. There's no way to imagine a punishment that would really fit! Isn't that more interesting than coffee?"

"Chee! Chee! Chee!" said Murgatroyd insistently.

"It wasn't wise to stay and try to make an ordinary public-health inspection. We'll send somebody else when things are back to normal."

"Chee! ! !" said Murgatroyd loudly.

"Oh, all right!" said Calhoun. "If you're going to be emotional about it, pass your cup!"

He reached out his hand, Murgatroyd put his tiny mug in it. Calhoun refilled it. Murgatroyd sipped zestfully.

The Med Ship *Esclipus Twenty* went on in overdrive, back toward sector headquarters of the Interstellar Medical Service. ■

IN TIMES TO COME

Next month's cover story is "Industrial Revolution," by Winston P. Sanders. It's another of the Asteroid civilization series Sanders is working up—and in this one he makes a point that's new, and important. To wit: In all past cultures, the human beings of the culture were the necessary object of the attack. Physical objects—towns, bridges, whatnot, might be taken or destroyed—but it was the people who had to be attacked.

In a strictly technological culture, this ancient formula no longer applies. And Sanders has a most remarkable sort of weapon that can kill a living cultural-complex without harming the most sensitive of human beings! The weapon, moreover, is one that is perfectly real, and available for use today—yet one that has been very little discussed save in strictly technical journals!

An equally long novelette will be "The Thirst Quenchers," by Rick Raphael. This one isn't in Raphael's Thruway Patrol series, but has to do with a problem as real to America's immediate future as the problem of superhighway traffic—the problem of "cool, sweet, water." Already men are making plans to borrow from Peter-area to pay the Paul-area, because George-area has more than the necessary amount of rainfall, while Peter has barely enough, and Paul-area is verging on

continued on page 80

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"TO INVADE NEW YORK..."

It would be foolish to do a thing a hard way, when there is such an easy way. In a technically dependent culture, people become quite helpless, really . . .

BY IRWIN LEWIS

ILLUSTRATED BY LEO SUMMERS

He was a tall, learned-looking man, about fifty, slightly stooped, with a bulging midriff, tortoise-shell glasses, graying hair, and a strange look in his eyes. I'd noticed him standing outside Shannon's Bar for about ten minutes, pacing back and forth. Then he came in and sat down next to me. It was late afternoon, before the rush hour, and we were the only customers in the place.

Jimmy, the bartender, put down the towel with which he'd been idly wiping glasses, and came over. "What'll it be?"

The stranger jumped nervously and looked blank for a moment. "Uh . . . er . . . a glass of beer, please. *Root* beer."

Jimmy snorted. "Try the candy store down the block."

"Oh," said the stranger, obviously upset. "Then let me have a glass of regular beer—mild, please."

I smiled at Jimmy as he filled a glass. All sorts came into Shannon's. Outside, the traffic on Third Avenue was only a faint hum.

The stranger licked the foam tentatively and wrinkled his nose in distaste. He put the glass back on the bar and shook his head.

"*Proh superi! quantum mortalia pectora caecae Noctis habent.*"

"Huh?" said Jimmy.

The stranger smiled briefly. "That is Latin. It means, Oh, ye gods, what darkness of night there is in mortal minds."

Jimmy shrugged and went back to wiping glasses. The stranger nodded to me. "Ovid said that. He was a wise man."

"Friend of yours?" I asked, just to be polite.

"He died nearly two thousand years ago." He tasted the beer again and pushed it away. "Permit me to introduce myself. I am Horace Howard Clarke, associate professor of Roman History at one of the universities in the city."

I introduced myself and we shook hands. "Tell me," he said, "do you believe New York can be conquered?"

One of those kind, I thought. And here I was with an hour to kill before meeting my date. "Lots of people have taken it in," I started.

"I don't mean that kind. I mean physically invaded."

"Pretty big job, I'd think."

"Very simple." He dropped a small metal disk on the bar. "This could do it—or at least help."

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I picked up the metal disk. "Why, it's a subway token."

"*Almost* a subway token," he said. "And therein lies the key to conquest. That—and the green lights." I edged away from him. This I didn't need! He leaned towards me. "If only I could convince someone," he said, his lips tight. "Perhaps *you* will believe me."

I got to my feet. "Sorry. But I've got a date."

"Please!" The voice was firm, all of a sudden. "It is vital!" I hesitated and Jimmy came over, in case there was trouble.

"Well," I said, deciding to humor him, "if it won't take long."

"*Brevi esse laboro obscurus fio.*"

"Oh?"

"If I labor to be brief I become obscure."

I sighed. A long-winded one. And in Latin, yet!

He motioned to Jimmy. "Let this gentleman have another drink, bartender." He moved closer to me. "I will tell you what I know," he said. "If you believe, perhaps you will be able to do something about it. This much is certain. Very little time remains before disaster strikes!"

It all began (he said) prosaically enough on the Tuesday of last week, on the third floor of the Public Library at 42nd Street, in Room 315. There, as you probably know, one may obtain books on most subjects by filling out a slip, receiving an odd or even number, and retiring to either the odd or even Reading Room, where your number will eventually flash on a lighted board. At the time I was engrossed in a study of the early life of Publilius Syrus and, I must admit, glanced only casually at the card given me by the young man at the desk. I saw that it was 18 and proceeded into the Even room on the right for what I knew from past experience would be a tedious wait.

Ah! Had I but paid more attention to the card handed me! But "*Ad poenitendum properat, cito qui judicat.*" "He makes speed to repentance who judges hastily." The card which I thought was numbered 18, was actually 81. I had inadvertently glanced at it upside down. Had the Roman numeral system been used, as I have long advocated, this unfortunate accident could not have occurred. a XVIII cannot be mistaken for LXXXI no matter which way it is turned!

Be that as it may, number 18 flashed on the board in a surprisingly short time and I hastened to obtain the book from the extremely harried young lady behind the counter. I returned to my chair at one of the long reading tables. When I opened the book, which was of a disturbing blue color, I was highly irritated to learn that this was *not* a biography of Publilius Syrus; furthermore it was not even in Latin. I removed my glasses to make certain (someday I shall simply *have* to get bifocals) and saw that it was a foreign cookbook.

Annoyed, I snatched the book from the table and started to return to the counter. As I did so, a green slip of paper fluttered from between the pages. I glanced at it idly. There was an address on it, scrawled in almost illegible block letters. "432 West 28th Street." Being of a tidy nature, I slipped the bit of paper into my pocket and turned, only to find my way blocked by a rather large man wearing a trenchcoat with upturned collar. He tapped the book significantly and whispered, "Eight-thirty tonight. You know the place."

With that he strode rapidly from the room, giving me no chance to ask him what he was talking about. Irritated, I returned to the counter where a smallish man, wearing a loud checked suit was arguing with the young lady. He was holding a number card.

"But I tell you," said the harassed young lady, "number 18 was flashed on the board and the book was picked up."

The little man clucked impatiently and waved the card. "But I have number 18," he said shrilly, "and I must have the book!"

Normally I am not a fast thinker. Years of teaching Roman history to classes of dozing students interested only in easy credits, are not reckoned to sharpen one's wits. However, I instantly realized what must have happened. I tapped the little man on the shoulder.

"Pardon me, sir," I whispered, "is this your book?" He whirled around violently. He had a thin, sharp-pointed face with deep-set eyes, heavy brow and a receding chin that terminated in a little scrub of a beard. Rudely he snatched the book from my hand and began leafing through it with shaking fingers.

I started to say, "If Roman numerals had been used instead of—" but saw he was paying no attention to me, so I headed for the Main Room to get another card. I had no sooner reached the entrance when I was confronted by the little bearded man again. His mouth was agape with distress, his loud-checked bowtie askew. He waved the book in my face. "Didn't you find anything in here?" he demanded.

"Not really," I said. "I have no interest in French cooking."

He shook his head vigorously. "I mean *inside* the book!"

"Quiet, please," said the guard at the entrance, holding his finger to his lips disapprovingly. I continued into the Main Room, the little man scurrying alongside me.

"Please," he pleaded, "think. Wasn't there *something* in the book?"

Irked at his persistence, I was about to move on, when I remembered. "Why, yes," I said, slowly. "There *was* something. This." I fished the bit of green paper from my pocket. He snatched it from me, uttered a squeak of delight, and hurried away.

Relieved that this untidy business was finally done with, I decided to forego Publilius Syrus for the day, since I was no longer in the mood and I had some important papers to edit. So I returned to my home, a rather large and comfortable room on the first floor of a converted brownstone in lower Manhattan. I had no sooner settled

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down at my desk when there came an urgent knock on my door. I slipped on my glasses and opened the door. Imagine my amazement and irritation when the little man from the library scuttled into the room. He hurried to the window and pulled down the blind. Then he firmly removed my hand from the doorknob, closed the door and locked it. He leaned against the door, facing me.

"There *is* no 432 West 28th Street," he announced, angrily.

"The information does not impress me," I said. "How did you find out where I live? And why?"

"I asked several of the librarians if they knew you. It seems they did. And since you are listed in the telephone book, the rest was simple." He held up the green slip of paper. "Was this ALL you found?"

Well, I thought, childishly pleased, at least I am not one of the innumerable nameless faces that pour in and out of the library daily. "What else was there supposed to be?" I asked pleasantly.

The little man sank into my favorite leather chair, almost disappearing from view. He waved the slip of paper aimlessly. "There must be more to it than this."

Despite his rudeness I found myself taking a liking to him. He was so intense and so—frightened. "There *was* a man," I said.

He leaped to his feet and clutched my coat. I believe he would have tried to shake me had I not been a foot taller and fully fifty pounds heavier than he. "What man!"

"In the library. He indicated that book and said something to me."

He leaped onto the chair in his excitement and grasped my shoulders with his hands. We stood thus eye to eye. "Please!" he begged. "Try to remember! What did he say?"

"Perhaps you had better tell me what this is all about, Mr. . . .?"

"Rumplestein. However, believe me, Professor Clarke, it is much better if you do *not* know."

I shook my head, displaying what my colleagues occasional call a streak of stubbornness. "You have upset me considerably. I feel I am due some explanation."

"No! No! No!" He shook his little head vigorously each time.

"Then I cannot recollect what this man said to me."

He groaned in dismay and stepped off the chair to the floor. "Very well," he said, finally. "You force me to reveal this." I waited patiently. His head snapped erect. His body stiffened. "I am engaged in a highly secret mission, the purpose of which is to prevent the collapse of this city."

I frowned. "You're not serious, of course."

"I have never been more serious in my life!"

"*Quem Jupiter vult perdere, dementat prius.*"

"What?"

"Whom Jupiter wishes to ruin he first drives mad," I said.

"You think I'm crazy?"

I didn't like the gleam in his eye and the tightly-pressed lips. I hastily decided I was better off with him gone. These little people, I am told, can sometimes get extremely violent.

"I most certainly do," I said, "but that is none of my affair. I will tell you what that man said and then I would appreciate your popping out of my life as you so unceremoniously popped into it."

"What did he say?" He leaned forward waiting, it would seem, as if the fate of the world hung in the balance.

"Eight-thirty tonight. You know the place."

The little man studied the paper, repeating the words. Then he emitted a shriek of ecstasy. "That's it! Now the message is clear! Thank you, Professor Clarke. You have performed a duty towards society and your city." He fled down the hall. I heard the front door slam and returned to my work with a sigh of relief.

About eleven o'clock the same evening, weary in body and mind, I was preparing for bed when there came what I can only describe as a feeble but urgent rapping on my door. The strange events of the afternoon completely forgotten, I opened the door. There, in the dim light of the hall, considerably the worse for wear, stood my little visitor of the afternoon. He was bare-headed, his dark curly locks plastered to his forehead with perspiration. His bowtie was missing and his checkered suit was covered

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with splotches of mud and some darker substance, especially around the left arm which he gingerly supported with his right hand.

"Mr. Rumplestein!"

He shook his head weakly and staggered into the room. "Not Rumplestein," he said, so low I could hardly hear him. "Tonight it's O'Grady." He collapsed on my leather chair, mumbling, "The door."

I bolted the door and hurried over to him. "What happened to your arm?"

"Never mind that now," he said stoically.

Despite his protests I carefully removed his jacket and cut away the sleeve of his shirt. There was an ugly wound on his arm. "How did this happen?" I asked, horrified.

"It's nothing," he said. Then he grinned momentarily. "The chap who caused it is feeling *no* pain at all!" He closed his eyes and his head began to sway. "If you have any liquor," he mumbled, "I feel faint, suddenly—"

I rummaged through my desk and found a tiny bottle of some cordial a colleague had once brought me as a jest, knowing I do not drink. While Mr. Rumplestein, or O'Grady, gulped down the liquid I inspected the wound. "A doctor should look at that," I said.

He shook his head and leaned back in the chair, the top of his head a good twelve inches below the top of the chair.

"I feel better now," he sighed.

"Then perhaps you will be good enough to tell me what this is all about." As I spoke I washed and dressed his wound as best I could. "You realize, my good fellow, for all I know you may be wanted by the police, in which case I could be arrested for harboring a criminal."

"I assure you, Professor Clarke, I am no criminal." He plucked a bit of mud from his beard and carefully deposited it on the table.

"But you've been wounded! And you infer you did some bodily harm to someone else."

He chuckled softly. "Bodily harm? I killed him!"

I recoiled in fright. "I must notify the police!"

"No! That would ruin everything! New York would be destroyed!!"

I clucked impatiently. "Please, Mr. Rumplestein, or O'Grady, or whatever your name is. If you cannot give me an honest answer, I shall be forced to call the authorities. This nonsense about—"

He held up his hand and emitted a huge sigh. "Very well," he said, "I will tell you what this is all about because my usefulness may come to an end abruptly and you may have to carry on. Listen carefully." I waited with mounting impatience.

"New York," he said after a brief pause, "is a huge, sprawling metropolis that breeds within itself the seeds of its own destruction. Transportation." I raised an eyebrow. "At best," he went on, "the traffic in Manhattan does not flow—it limps. Let one traffic light fail and vehicles are backed up for several blocks. True?"

I nodded. "Yes."

"Very well. Imagine, then, a situation where, at one given instant every single traffic light on this congested island turns green and STAYS green." I shuddered at the thought. "Picture the beauty of it," he said. "Not red, which would cause all automobiles to stop, but green, the signal to go! Imagine their mad desire to rush forward in righteous obedience to the law, and their awful frustration to find every other automobile and truck obeying the same law, regardless of the direction from which it is coming. It has been estimated by noted mathematicians who are involved in this plan, that within forty-five seconds all traffic in Manhattan would come to a standstill, it becoming impossible for a car to move forward or backward. Oh, what utter chaos!"

"*Ab homme homini periculum quotidianum,*" I said.

"Eh?"

"Man is daily in danger from man. An ancient Roman said that."

"He knew what he was talking about. But this is only Phase One of the plan. A corollary is based upon the axiom that one disabled automobile is equal to ten thousand operating ones."

" I don't follow."

"The highways leading into and out of this island. Regardless of the number of lanes, if one automobile breaks down, traffic is immobilized for miles. Multiply that by several dozen, all at the same time, on all the entrances and exits to the island, and no earthly power could untangle that situation in less than a week, if then!"

His words evoked an image of metal monsters, stretched as far as the eye could see, steam pouring from their overheated radiators as they raucously bleated for help.

"All this can be accomplished quite simply and inexpensively," continued my bearded little man. "However, what subsurface transportation?"

"You mean the subway system?

"Exactly. Once again, simplicity is the key. What do subway riders use to gain entrance through the turnstiles? Tokens. Let us suppose that on this same given day the majority of tokens distributed are all fractionally larger than normal. Not enough to be noticed, mind you, but just enough so they cannot pass through the slots and activate the mechanism."

"But—"

"Do you realize the absolute ingenuity of this plan? Subway riders by the thousands will be trying to put tokens *that they paid for* into slots that will not receive them! The tremendous howl of anguish that will arise! The roar of frustration and then anger as the thousands pile upon the thousands at rush hour! The screaming and pushing as multitudes press forward at each subway station, demanding their rights of ingress as good citizens, while more multitudes press from the incoming trains demanding their rights of egress! Unquestionably the entire subway system will collapse in a matter of minutes! What was it you said before?"

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"Ab homme homini periculum quotidianum?"

"And how!" He lit a cigar and puffed away for a few moments, filling my room with its foul odor. "Ingenious, eh?" he said finally.

"But to what end?" I asked. "If anarchy rules the city, how could whoever is behind this plan assume control?"

He leaned back in the chair, disappearing from view. "That is not part of the scheme. The purpose is to arouse the rest of the country to what has happened to its greatest metropolis. Every eye, ear, radio and television station will be turned towards Manhattan. The armed forces, all the resources of the government will, within hours, pour into the city, or try to. And at precisely that moment the rest of the country will be childishly open to invasion! If this plan succeeds, professor, the United States will be conquered within a matter of days, with remarkably little destruction or loss of life."

I stared at the little figure in the chair. Was he serious? More important—was he sane? "Who is planning this invasion?"

"Who else?"

"Why tell me this story? Why not go to the authorities?"

"I need sufficient proof, first. Unfortunately, matters are coming to a head far sooner than I expected. In addition, my disposing of one of their men earlier," he tapped his left arm significantly, "has left me in a vulnerable position. I dare not go to the authorities myself, for fear of exposing myself. And believe me"—he snapped his fingers—"I would not get as far as the nearest policeman. However, professor, *you* are unsuspected. *You* could report this plan with no danger to yourself.

"Enough! My dear Mr. Rumplestein-O'Grady, do you expect me to charge into a police station and blurt out this ridiculous story?"

"I don't expect you to charge anywhere, professor. Not without proof. I will get the proof for you, by tomorrow. Then—as I suspect—if *I* am unable to warn the authorities, I will expect *you* to do so. In the meantime, make use of these when you go to the university, tomorrow. I found them on the body of the man I disposed of."

He dropped several tinkly objects on my desk, rose, and, without another word, was gone. I picked up the items. They were subway tokens. I hurried to the window and glanced out. I could see the little man hurrying down the street, his head bobbing up and down like a swimmer in the ocean. Then, my mind in a turmoil, I turned out the light and went to bed. Fortunately, regardless of the press of circumstances, I have never had difficulty in falling asleep and tonight was no exception.

At seven-thirty the next morning I arose, dressed, and prepared my breakfast. I thought of the events of the preceding evening. Had it not been for the bloodied towel with which I had washed the little man's wounds, I might have dismissed the entire incident as a dream. I continued to think about it while walking to the subway. I berated myself for taking the story seriously even for a moment, as I dropped a token into the turnstile and pressed forward. I gasped in sudden pain as the turnstile, still locked, pushed into my midriff. I glanced at the token in the slot. It had not dropped. I pressed it down. It refused to budge. I tried several other tokens, all with the same result. By this time half a dozen people had gathered behind me, making angry remarks. Flustered, I backed away, bought a token from the cashier, and rode to the University. Then it was I recalled that I had tried to use the tokens my strange visitor had placed on my desk before parting from me, and which I had, without thinking, picked up in the morning.

All that day I pondered over the tokens and the odd tale of Mr. Rumplestein-O'Grady. I could still give it no credence, but I *was* disturbed. On my way home, that evening, as is my wont, I bought a newspaper and began reading it casually. Just before reaching my station I came across a small item on one of the inside pages. It stated that a small, bearded man, wearing a checkered suit, had been found in the river that morning, stabbed, There were no identification papers on him, only a pocket full of subway tokens which, police believed, had been used to weight down the body.

"Good heavens!" I said aloud. Several passengers raised their eyebrows. I flushed, hurried out of the train and to my apartment where I fell into my chair, shocked and shaking. No doubt the body was that of Rumplestein. The poor little man! What did this mean? Could his story conceivably have been true?

The knock on my door startled me. "Professor, are you home?" It was my landlady. When I opened the door she handed me an envelope with my name written on it in small, neat letters. "A little fellow with a beard gave it to me early this morning, after you'd gone. He said to be sure you got it. Then he ran away." She shook her head in obvious disapproval of such actions.

After she left I tore open the envelope and read the contents.

"By the time you see this chances are excellent that I shall be dead. However, that is of little importance. I have found the proof we need—their distribution plant. It's an old warehouse. I am going there to see if I cannot obtain concrete proof—perhaps a pocketful of tokens. If I fail, you must carry on. Farewell, professor. It was a privilege knowing you."

Beneath the message was an address which I recognized as being in one of the less reputable sections of the city. There was no signature.

What to do! What to do! I no longer doubted the truth of little Mr. Rumplestein-O'Grady's story. But what to do about it? I considered going to the warehouse, but the thought of high adventure sends nothing but ennui coursing through my veins. Besides, there was undoubtedly some element of danger in that course. The police! Naturally! They would know how to deal with this situation and perhaps even avenge poor Mr. Rumplestein's

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death. Filled with righteous anger and indignation I hurried out and went to the nearest police station.

In retrospect I can understand the reaction of the desk sergeant to my wild-eyed claim that the city was in imminent danger of invasion and he must do something about it at once!

"How much, now, have ye had to drink?" he asked calmly.

When I swore that I was as sober as he, he grew purple with rage and threatened to have me thrown into jail for insulting a police officer unless I disappeared immediately.

All that night and the next day I tried to reach someone in authority with my information. The New York City police were admirably calm about my information. My actions and voice, however, seemed to disturb them greatly. When I insisted they investigate the warehouse, they told me the officer on the beat would do so in good time. When I suggested they examine the tokens found on the body they informed me that these had been turned over to the Property Clerk and if not claimed within ninety days would be given to the PAL.

As a last desperate measure I went to the New York office of the Federal Bureau of Investigation and presented myself to one of the Federal men. I told him my story. He looked at me calmly, then pored through a thick book on his desk. He closed one eye thoughtfully and peered at me through the other.

"There's really nothing," he said, "that we can do about it."

"Don't you believe me?"

"That has nothing to do with it. According to regulations this is strictly a municipal affair. It doesn't come within the jurisdiction of the FBI. And we wouldn't want to step on municipal toes." He closed the book smartly.

I was crushed. I couldn't believe it. Finally I said, "*Serum est cavendi tempus in mediis malis!*"

"What?"

"'It is too late to be cautious when in the very midst of dangers.' Seneca said that two thousand years ago."

The young man rose and nodded towards the door. "Good day, professor. And an *E pluribus unum* to you!"

That was an hour ago.

Professor Clarke stopped talking. Jimmy and I said nothing. The only sound was the hum of traffic outside. "And that is the way it is, gentlemen," said Professor Clarke, finally. "*Quando cadet Roma, cadet et mundus.* When Rome falls—the world!" He sipped the beer which by now had gone flat. "Do you believe me?"

Jimmy and I exchanged glances. "Have another beer," said Jimmy. "On the house."

"I see." Professor Clarke sighed. "Well, I cannot really blame you, gentlemen. I only hope you do not live to regret it." He got up and put a coin on the bar. Jimmy went to make change.

Then we became aware of automobile horns blasting steadily on a rising note of urgency. Jimmy and I ran outside. Traffic was piling up rapidly in the street. And as far as we could see in every direction, all the traffic lights had turned green!

"Holy cow!" said Jimmy. "He was telling the truth!"

"So it appears," said a voice at my elbow. I turned. It was the professor. There was a sad, wistful expression on his face. "*Quod erat demonstrandum,*" he said softly. "Q.E.D." Then, as the horns got louder, and we could hear drivers cursing, he strode down the street and around the corner.

"Professor!" I yelled. "Wait!" I started to run after him when the horns stopped blowing. Cars started moving again, and many of the traffic lights had turned red.

Jimmy wiped his face in obvious relief. "Must have been a short circuit," he said hoarsely. "But for a minute—"

"Yes," I said. "A short circuit. Or maybe—a dry run to test facilities for the big day?"

Neither one of us said anything, but we both had the same thought as we returned to the bar. I picked up the subway token the professor had left there. I flipped it in the air several times and looked at Jimmy. He nodded in agreement. I went out and headed for the nearest subway.

Q.E.D.? ■

THE ANALYTICAL LABORATORY

Space problems on this type-metal jig-saw puzzle called ANALOG cause wild fluctuations in the extent of the Lab here. This time we've just room to make up for not having any room last month by running two Labs this issue:
The Editor.

APRIL 1963

PLACE	STORY	AUTHOR	POINTS
1.	What'll You Give?	*Winston P. Sanders*	2.48
2.	Frigid Fracas (Conc.)	*Mack Reynolds*	2.62
3.	Sonny	*Rick Raphael*	3.27
4.	A Slight Case of Limbo	*Lloyd Biggle, Jr.*	3.96
5.	Iceberg from Earth	*J. T. McIntosh*	4.12

MAY 1963

1.	The Dueling Machine	*Bova & Lewis*	1.86
2.	Expediter	*Mack Reynolds*	2.88
3.	The Ming Case	*E. C. Tubb*	3.20
4.	Oneness	*James H. Schmitz*	3.43
5.	The Last of the Romany	*Norman Spinrad*	3.54

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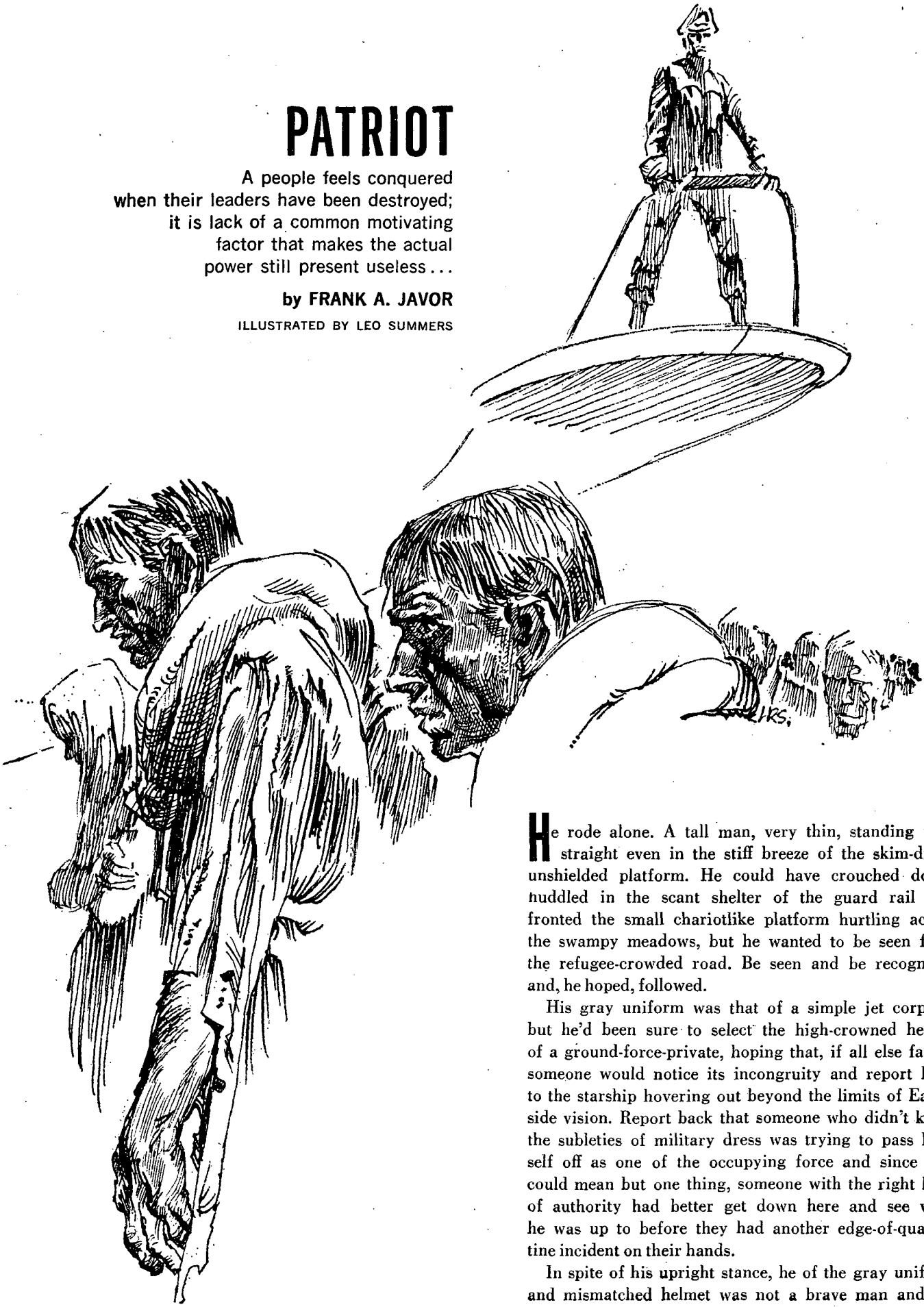
PATRIOT

A people feels conquered when their leaders have been destroyed; it is lack of a common motivating factor that makes the actual power still present useless . . .

by FRANK A. JAVOR

ILLUSTRATED BY LEO SUMMERS



He rode alone. A tall man, very thin, standing very straight even in the stiff breeze of the skim-disk's unshielded platform. He could have crouched down, huddled in the scant shelter of the guard rail that fronted the small chariotlike platform hurtling across the swampy meadows, but he wanted to be seen from the refugee-crowded road. Be seen and be recognized and, he hoped, followed.

His gray uniform was that of a simple jet corporal but he'd been sure to select the high-crowned helmet of a ground-force-private, hoping that, if all else failed, someone would notice its incongruity and report back to the starship hovering out beyond the limits of Earth-side vision. Report back that someone who didn't know the subleties of military dress was trying to pass himself off as one of the occupying force and since that could mean but one thing, someone with the right kind of authority had better get down here and see what he was up to before they had another edge-of-quarantine incident on their hands.

In spite of his upright stance, he of the gray uniform and mismatched helmet was not a brave man and his

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palms on the guard rail in front of him were slippery with sweat. Nonetheless, he leaned his body somewhat to the left to direct his skim-disk even closer to the bomb-chewed highway. Perhaps he was too far away to be made out.

But aside from the dumb, following stare of the bone-deep weary and thoroughly beaten, there appeared to be no one among the trudging mass of humanity who really saw him.

He leaned his body even more to the left to put his skim-disk into a tight half-circle, churning up a small spray of mud and weeds as the cushion of air it rode on was deflected to the side, and swept back alongside the road in the opposite direction, but with no better success.

He sighed and hit the power stud under his hand with the edge of his fist and the skim-disk came to a hovering stop just short of the weed-covered rise beyond which he knew the glaring yellow-orange twin domes of the newly set up inner-rim check point straddled the highway. He wanted desperately to make the roadside sweep at least one more time, but he dared not.

Filled with dismay, he dropped to his haunches and, using the floor controls, sent the skim-disk off at right angles to the road, bottoming along a rotted-smelling drainage ditch, keeping well in the shelter of the high weeds rimming it, his stomach cramping with frustration and relief.

He noticed that the wind of his passage and the churning exhaust of his craft were making the weeds dip and swirl and, reacting in alarm, he cut the skim-disk's speed down to almost zero altitude and still he trembled in the dank and heavy air.

With the cooling breeze gone, the helmet was heavy on his head under the steaming sun. He undid the chin strap and took off his helmet. Without it, he suddenly looked singularly nondescript. Aside from his thinness, an ordinary looking man, not old, but not very young; hair thinning and now plastered down with sweat; a face as tired and worn looking as any among the fleeing masses on the road, yet somehow mingling oddly a look of resolve with its hopelessness.

He chewed his lower lip, thinking, his hand absently going inside his blousy-fitting tunic to feel the rolled and now sweat-soaked bundle of cloth as if for some kind of reassurance.

From above came the heavy and growing throb of a multi-engined flier and the man on the skim-disk hunched down instinctively even though he knew that, if he were seen, a single blip from one of its beamers would smash him and his disk flat into the soggy ground beneath them. A man, even one wearing their own uniform, skulking in a swampy area away from a main artery, should not be where he was and would, therefore, be *destroyed on sight almost as a reflex action.*

But now that the flier was closer, he recognized it as a personnel carrier and let go the breath he'd been holding in almost a gasp of relief. Personnel carriers, he'd observed in the past two days, almost invariably carried no arms of their own.

He struck the skim-disk's speed control once, and then again. He had to get out of there fast and never mind the moving weeds now. The flier might not have noticed him against the general overgrowth of the swamp but he couldn't risk assuming that. It was possible that they had and someone was already acting on their report. He needed to be seen and recognized for what he was, but somewhere where he would be followed and perhaps an attempt made to pick him up, not here where he would be smashed on sight.

The brassy taste of fear was in his mouth, but he did not think to ask himself if what he had in mind to do was anything more than a futile gesture, or even why he should do it at all. He was no hero, that was for sure. Only two days before this one he was just a guy tailgating along the highway, too close upon the car in front of him for any degree of safety, but pressed in by the cars behind and around him, all of them anxious to get out of this jam and home at last.

And then he saw it. A huge sphere, gigantic, copper colored, like another sun—shining, glittering. Settling down over the skyline of the city ahead.

Brakes squealed around him, someone sideswiped him from the side, he fought his car and his brakes, was struck again and himself plowed into the car in front of him, but sideways and slowly spinning end for end.

Around him was a crashing and the screech of tearing metal and his own car continued its lazy movement. Slowly to the edge of the road, against the fence, snapping the posts, at long last settling still, tangled in the strong and snapping cables.

He sat stunned for a moment, hands gripping his steering wheel. The sound of crashing was still loud behind him and he clambered out of his car, panicky, intent only that he get clear of the road and its still flying wreckage.

Later, from where he lay behind a small rise in the weedgrown and swampy meadows, he thought to go back. To go back and see if there was anyone he could help among the wrecked cars and piled up shambles that had once been a normal homebound traffic bustle, but by then it was too late. By then the work of the hellish sphere was too far under way.

The sphere dropped no bombs, appeared to carry no weapons, but the swarm of fliers that spewed from huge circular openings in its sides did.

Stubby craft, blunt winged, thick through the body like the men who piloted them. They dropped their bombs, nonatomic, in small clusters and raked the ground and anything that went up to meet them with strange sonic beamers that ripped and tore asunder what they didn't smash flat.

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They raced from their mother ship to an outlying perimeter and worked back inward toward the city, smashing and blasting and tearing.

And over it all a sound, a high-pitched, keening sound. A sound as of broken glass, its edges grating; as of legions of chalk sticks on acres of blackboard. Heard in the brain and in the nerves, on and on. Endlessly.

Its purpose was plain. It did not appear to bother the invaders, the thick-bodies men with the pale hair and the pale eyes. But their victims could not fight, could not defend themselves, could not even think. They could but hold their hands to their ears and their heads and scream.

But the keening was gone from the meadows now and, the man crouched on the hurtling skim-disk supposed, it would soon be gone from the city. The city, where the main body of the conquerors, their starship lifted away, too huge to be contained inside the force field now shielding their bastion, still kept up the keening from dome-shaped generators hanging from small spheres floating over the bombed-out areas.

But its unnerving effect, greatest on first impact, could be gotten used to. The man on the skim-disk didn't like it, it still pained his eardrums to hear it, but he could stand it now if he had to. And he would have to soon, he hoped.

Piled high across the marshy meadows was a rampart of earth, along the top of which ran long-abandoned railway ties. Cutting through it were many large concrete culverts. Into one of these the man darted his skim-disk and brought it to rest on the ooze and slime covered bottom. He squatted, heedless of the vile smells, debating with himself what to do next, welcoming the excuse to catch his breath, regather his nerve.

His overall plan, if it was that and not just the emotional fixation of a fool, was direct enough, but in the midst of an invading force, some of whom were manifestly trigger happy, he was more than just likely to be blasted first and questioned afterward. According to the talk rife in any invaded city, a patrol of bully-boys, roving along the outer quarantine area rim had even caught up with and smashed one of their own agents. A top man, he turned out to be, and wearing their own uniform at that. Yes, they saw the uniform, but he didn't look like one of their own. He *looked* like an Earthman and they thought . . .

The order went out. Keep to recognizable roads. And to the troops, "Don't shoot, blast it. Report in and we'll send down a man from Intelligence."

But the chewing-out rankled and the troops were edgy and on the prowl. Now anyone caught off the designated arteries was fair game and if he happened to be one of those self-important agents, then he really had no one to blame but himself, did he? At any rate, any chance a man caught out of bounds might have had before the rim-of-quarantine incident was gone.

Again the feeling of uncertainty, of despair, flooded through the man in the culvert. *Drop it. Leave it and run. Nobody is telling you to do this. Shuck off this stolen uniform and take your chances on getting out with the others. Didn't your Navy days teach you not to volunteer? Who do you think you are to go up against an enemy so strong . . . so well prepared?*

Well prepared and long, it was now obvious. The agent killed on the rim looked like an Earthman to the men who blasted him. It was not surprising. He'd been picked to go on ahead for just that reason.

Pick the thinner, taller ones from among your breed. Color the pale hair with dye, hide the pale eyes behind contact lenses. Drop your men at night, in remote areas, singly at first, then in greater numbers as you learn and grow bolder. Learn, too, that the Earthmen do not suspect yours. They do not look strange to them, do not sound strange. Why should they? These particular Earthmen are long accustomed to men whose skins and voices and bodies differ from their own even more markedly than do those of your people. And you congratulate yourself for having selected for your vital first foothold on their planet a city with so polyglot a population.

But valuable as your infiltrating men are before you invade, they will be doubly, even critically so, after you land. You do not want, you cannot afford to lose them. Particularly when you know that you cannot help but kill some of them in your initial bombing.

So how mark the survivors so that your troopers will know them on sight from the others under their guns?

The answer is simple and as old as any army on any world. Let each agent take his uniform with him, hide it, and come forth wearing it when your starship lands his brothers.

The man in the culvert shivered, not altogether from the clammy air, his stomach cramping from hunger. But he did not let himself think of stealing food. Caught in that, he would be blasted on the spot and nothing gained.

He fumbled with his helmet, putting off for even a scant few moments the going out again, the leaving of even this dubious sanctuary, to make a single sweep of another road. A single sweep because he must not appear to want to look suspect, to be followed.

From inside the liner of his high-crowned helmet he took what looked like a folded piece of paper, opened it, read again the arrogant words, black, heavy, on an orange background. English first, then the other languages known to the different peoples of his city. He folded it again, the off-world texture strange to his fingers, put it back.

He put the strange helmet on his head, pulling up the chin strap tight in the manner of the invaders he'd observed. Invaders from whose bodies he'd taken the

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garb he now wore when he'd first conceived his wild plan. Deliberately selecting its parts from men the rest of whose respective uniforms differed from each other in detail widely enough for even his untutored eye to detect. Remembering from his own Navy days how proscribed were the dress and insignia of each military rank and service, thinking back to how his own suspicions would have been aroused by seeing them mismatched.

He hefted the packet of cloth inside his tunic to a more comfortable position, cautiously eased his skim-disk out of the dimness of the culvert.

He emerged from its flaring concrete mouth into the bright sunlight, blinking, instinctively ducking his head down and away from the sudden brightness. The movement saved his life.

From where his head had been came a throbbing whir and a double-fist-sized chunk of the concrete wall to the side and slightly behind him fell with a solid squish into the slime and mud at its bottom.

Instinctive had been his turning away from the brightness of the sun in his eyes, instinctive was his dropping now. Dropping with the sound of a shout in his ears. The high-pitched, brassy voice of the invaders. Dropping not to the center of his skim-disk platform, but throwing his bunched-up body hard against its rim.

The disk, ever sensitive to the body balance of its rider, dipped sharply onto its edge, hung teetering like some huge coin about to fall.

A shout, brassy, answering, from the other end of the culvert.

As he went down, the man on the disk hit its power control to full blast. The column of air from its bottom, not a downward-thrusting cushion to sustain the disk in flight now, but directed to the side, ploughing across the surface of the swamp, a roaring, churning, mud, slime and rock laden tornado hurtling full into the direction from which had come the shot.

Who or what was there the man on the disk did not look to see. As his disk vanished momentarily in the shower of air-blasted swamp debris, he dropped from its edge, slithering in the mud and slime like some huge crab, flinging himself at the rim of the culvert's mouth, at the abutment, narrow and flaring, put there to bolster the earth of the rampart, deflect its choking erosion.

At the abutment and behind it—not crouched now but standing, breath locked in his chest, open to anyone coming over the top of the rampart, but hidden by the narrow right-angle of concrete from the mouth of the culvert.

Behind him, on the enemy side of the wall, his skim-disk, free of his weight, spinning, sending showers of debris in all directions, righting itself and with a sputtering roar, at full blast and with no burden, dipping and skittering and vanishing almost at once into the man-high weeds—a great swaying, a great swirling, an erratically diminishing roar.

Behind him, on the enemy side of the wall, voices. Two only, one echoing in the culvert, high-pitched and angry-sounding.

He did not look out, he did not move, he waited. They could not be afoot, not here, yet he'd heard no craft approaching. He smiled wryly. He could have stayed with his skim-disk and outdistanced them.

The voices were still there, then one talking mechanically as if into a communications device.

The two voices, no longer shouting. From off in the distance, in the direction his skim-disk had taken, came a sound of desultory blaster firing, the light throb of a small flier approaching and now the man in hiding was thankful for the rightness of his impulse not to make a run for it.

The flier was close and stopping and the man pressing hard in the abutment angle prayed that they would not cross over the rampart when they lifted off. Cross over and look down to see him, naked to their weapons.

The unseen flier lifted off and he sagged, letting go his breath in a gasp of relief. They were headed back toward the city from whence they must have come, still sweeping the grass, from the sound of it, still searching for him.

He slithered back into the culvert, hidden from view from the air, animal-alert to sounds on the ground. He was hunted now, truly hunted, and the subtleties of his plan vanished. His plan that needed for him to be taken, not by troopers who would blast him on the spot, treating him as he'd seen them treat others who looked to be trying to escape from the treadmill of roads they were being kept milling around on, but by a man from the enemy's Intelligence.

His plan, brimming over with risk, to be taken not for killing, at once, but for questioning at their headquarters. Headquarters which fleet word-of-mouth had pinpointed for him. Headquarters atop which the event ordained in the black-and-orange circular folded inside his still-tightly-strapped-on helmet was scheduled to take place in a matter of hours now.

Panic is, in a way, self-limiting and the man felt better now. He stood up, absently brushing at the mud and slime of his sodden uniform. Fleetingly the thought to chuck the whole thing passed through his mind again. He shook his head.

Cautiously he emerged from the culvert and, keeping in the meadow grass skirting the boggier places, painstakingly made his way toward the city, ignoring the hunger of his stomach, the bubble-lightness of his head. He had a long way to go and not much time.

There was still a little daylight left when he came up behind the stone wall bordering the cemetery on the edge of the old part of the city. He'd seen one flier crossing, met no patrol, but he was shaking with the strain. He squatted down and made a last check of the cloth bundle he had under his tunic. Taking it out he

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held its rolled-up form in his hands, checking the twine holding it bound at each end, the longer length of heavier line looping around it. Satisfied, he put it back, buttoned his tunic. Time was pressing him now.

Through the cemetery was the best way, he thought, along the back of the old brownstone church, through it, perhaps, to get a view of the plaza beyond.

He was hidden now, but he'd be in plain sight for the brief moment it would take him to go over the top of the wall. He would rather have waited for a deeper darkness to fall, but there was not enough time. He took a deep breath, stood up and leaped for the top of the wall, hoping that the men he was sure were posted in the still-standing church tower were not as alert as they should be.

He hung there by his hands for the moment, then was up and over and dropping on the other side, crouching in the shadow, unmoving, listening for the shots.

There were none, only the high-pitched keening of the invader's sound cones, louder on this side of the wall.

On his belly now, he moved toward it and the darkening bulk of the church, ever on the watch for signs of alarm in the tower.

There were none and he made the shelter of the church wall gasping his relief He was aware of people now, many of them, although there was no particular sound he could make out above the keening, loud enough now for him to have to consciously ignore it.

The small door to the church basement was locked, the iron grids over the smashed windows solid, but the door at the head of the narrow stone steps swung askew on one hinge. He hesitated, then flung himself up the stairs and into the main body of the church, cringing at the half-expected blows.

There were none. The church was deserted. He listened, hearing no scrape of a boot, no stirring of a body, no sound of movement. Nothing, only the high, infernal, thought-disrupting keening from the plaza. The tower was unoccupied after all.

Encouraged, he made it to the choir loft, peered cautiously down through its round, smashed window, and knew why he'd sensed the presence of people.

The plaza was crowded and more being herded in. In groups and pressed together, his people, some standing dumbly, some with their hands pressed over their ears, all silent, all under the double thrall of the keening cones and the scattered troopers.

Diagonally across the paved open area he could see the broad steps of the city hall, over their center a high platform built, draped in stark, monolithic fashion with the colors of the invader. Floodlights ranged below and to the sides of it, but not lighted. Behind, towering, huge disklike pans atop slender crisscrossed tripod legs, their purpose unknown to the man peering down from the shattered window.

He licked his dry lips. A thin line of troopers, leaning idly on their rodlike blasters, going out of sight behind the lit-up bulk of the graystone building, keeping a broad area surrounding the city hall completely free of his people. This was the forbidden ground he'd thought to be escorted across as the prisoner of an enemy agent.

He shook his head. It would never have worked. Yet there was the area and he had to get across it. Somehow. Across it, into the building and up onto the narrow false balcony that nestled just under the high copper dome.

Again and again he studied the plaza below him. The people, the troopers, the broadness of the forbidden area. He shook his head.

He unbuckled his helmet, took it off, rubbed his hand over his sweat-plastered hair. There was no way, yet he had to get across. He had to.

The floodlights came on suddenly, went out, came on again, stayed. Glaring light washed over the platform, the building facade behind it, the decorative balcony, the towering dome.

Choking back a groan, the man at the shattered window dropped from his place, ran down the stairs and out between the knocked-askew doors of the church. Then, with a boldness born of desperation, of great weariness, his Earthman's hair exposed, one thumb hooked in the strap of the helmet slung over the shoulder of his muddied and unkempt uniform and letting his weariness show, he slowly and deliberately made his way down the stairs, across the plaza and into the floodlight's full glare.

He saw the troopers, saw the nearest of them turn toward him, saw their uniforms, neat and clean, their hardware polished. Saw their eyes, red-rimmed, tired, but easy looking, relaxed. The eyes of men satisfied with, even a little contemptuous of, their solid victory. Eyes flicker over his sullied uniform, stay, mildly questioning. One trooper, the second from him on the left, lifted the crossed butt of his blaster from the pavement. The man fought to keep from hastening his step, let his weariness sag his body as he passed. The butt fell back.

He was nearly to the stairs now, about to start up them. Ahead he heard a voice, shouting, brassy, and again he almost choked on his heart. He looked up. Saw the spit-and-polish figure at the top of the stairs, saw the wildly waving arm. Tripped in his relief. He did not understand the language, but the meaning of the anger, the gesture, was universal. Above him was an officer, intent only on getting this miserable looking dung heap of an enlisted man out of sight before any of the momentarily-expected big brass saw him.

The officer was pointing to the side of the building, gesturing vehemently. The man in the soiled uniform came back down the one step up he had taken, shuffled around to a side door as directed, saw the troopers nearest him grinning.

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Inside the building he kept up his tired shuffle, up the side stairways, carried along in the midst of the swarming enemy uniforms by the exhilaration of danger. Carried along and finally standing in the small bay outside whose bomb-shattered windows was the false balcony he wanted to attain.

He did not hesitate, did not even glance to the side for the presence of danger, but deliberately stepped through the glassless sash and was crouched in the pocket of blackness made by the floor of the balcony in the glare of the floodlight coming from below.

He worked rapidly now, breathing only with the top of his lungs, his fingers flying. From his pocket he took a knife, opened it. From under his tunic he took the sweat-soaked folded and rolled bundle of cloth, unwound the heavy line looped to it.

From the low rail of the city hall balcony projected a flagpole. Empty and short as flagpoles go, but sticking out over the still-empty platform below. Staying in the black shadow, he reached up and pulled in a loop of its lanyard. He cut it and swiftly tied the now loose ends to the heavy cord of his packet.

Gingerly, and still rolled, held so by the light twine bound around its ends, he eased it out to the end of the flagpole, wincing as it bobbed and swayed in the floodlight, hurrying now that he was so close to the accomplishment of his self-assigned mission.

The topmost knot he'd made caught in the flagpole pulley. Gently he pulled the upper lanyard. It would not move. He wiped his sweating palm and pulled again, more firmly, on guard against a sudden giving, a snapping movement. A little harder, firmly, easingly—and the knot was through.

The man sagged back against the wall in the shadow It was over. At least his part of it was and he wondered again and for the last time if he'd risked his life for nothing but an empty gesture. He took a deep breath in the darkness. Empty gesture or not, it was his and he had to make it. For now, he had to get out of here and leave it to a confident enemy to play out the rest of his plan.

And play it out they would if they did what the orange-and-black circular folded inside of his helmet said they meant to do.

The man sat in his chair—battered and smelling still of shattered plaster, but his own chair. The TV he was watching, however, was a shared one and small. The president's face on it hardly as big as an apple. But his voice was clear.

". . . He was as leaven to the rest of us. As a little leaven can ferment the whole loaf, as a single spark can set ablaze the whole of the forest, so this man did to us. At the precise moment of our greatest blackness, at the precise moment of what seemed to be the enemy's greatest triumph, when they were about to place the seal of their dominion upon us, this man, this hero, this patriot, by his action brought confusion to their ranks, demonstrated to us that they could be beaten. Struck in us the spark . . ."

The man in the chair smiled, seeing again in his mind's eye the great sphere of the starship settling. The magnificent figure in the bejeweled, medieval-looking breastplate, the almost albino paleness of the bared head. The descent to the platform amid the terrifying increase in the sound of the keening, the crashing of the cymbals the pale men favored. The purpose of the flat dishes atop the slender tripods suddenly plain as each burst into a roaring tower of flame. The spotlights highset on other towers swept across the packed and subjugated humanity, crossing and recrossing their stark beams. The moment promised in the orange-and-black circular, the first raising of the victor's standard over conquered earth.

Then the climactic moment, the looking upward, the lone figure on the flagstaff balcony. A lone figure, in spic-and-span uniform and burnished helmet, struggling with a locked-in lanyard, the desperate tug and the sudden breaking forth into view at the head of the floodlit flagstaff, not the expected banner of the enemy, but the flag of his own Earth nation.

The sudden stillness, only the keening . . . and then the roar, the roar of a thousand throats.

The great surge forward of the people, the troopers vanishing as under a tidal wave.

The carnage. The hand-to-hand fighting with clubbed weapons and at the last with no weapons at all.

Some made it to their starship and it was gone. If they ever recovered from the sudden, the dramatic loss of their leader and came back, they would come back to Earthmen who knew they could be beaten, knew they were not invulnerable.

". . . From the manner in which our flag broke free and other evidence we have been able to gather," the president's televised voice was saying, "it seems clear that this grand deed was the work of someone familiar with the handling of flags, of the tying of knots. A former sailor, a signalman perhaps. At any rate, whoever he is, wherever he is, I speak to him now. I say to him come forward. Come forward and identify yourself. Come forward and accept the plaudits and the gratitude of your people. Come forward . . ."

The man in the chair looked suddenly embarrassed. "Thank you, Mr. President," he finally half-said, half-mumbled to the televised image in front of him, "but I've had enough heroics to more than last me. I still don't know what got into me, I was scared every minute. So if it's all the same to you, I'd just as soon forget the glory and hope it never happens again."

There was no answer, of course, from the screen in front of him and the man settled back to enjoy the rest of the program. He did, but when the military band came on at the close he couldn't help but wish that they wouldn't go so heavy on the cymbals. ■

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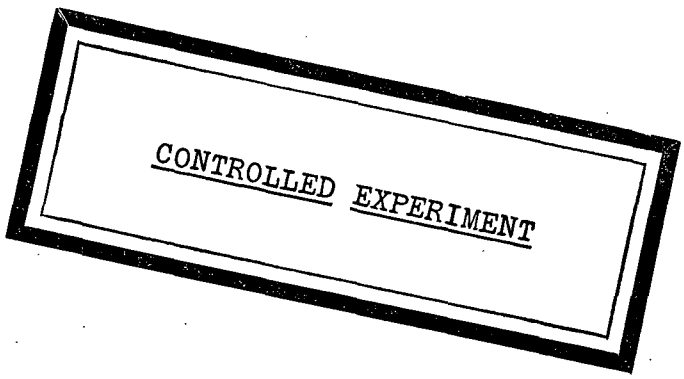

One thing that might have loused up this controlled-but-good experiment might have been one of the experimenters' small children. A little child could crack the problem the great scientist missed. BY ARTHUR PORGES

"Objective evidence—laboratory-controlled evidence —that's what it will take to convince *me*. And that's what the mystics can never produce!"

Nils Larsen glared at Dr. Corman as he delivered the challenge. Obviously, he was still smarting over the hoax of the intelligent roaches, and hoping to get back some of his own.

"Oh, I don't know," Corman said in his squeaky voice. He put a cigarette in his holder, undoubtedly aware of how the gesture annoyed Larsen, who preferred a rapid drumfire of interchanges in any argument.

"What do you mean, you don't know?" Nils rumbled, his thick-set, stocky body seeming to contract like that of an angry cat. "You object to laboratory methods, to controlled, predictable experimentation?"

"Of course not." Corman lit the cigarette with great deliberation. "I mean that such evidence might be produced at any moment. Consider the reports of Soal, in England—"

Nils snorted, looking at the other scientists, and shaking his head.

"Why not go back to Sir Oliver Lodge, and the snapshots of fairies dancing in the garden!"

"As a matter of fact," Corman chirped, his voice as always a startling contrast to his big frame, "I've had some success myself of late. I'm not sure it's up to strict lab conditions . . ."

"I'll bet not!" Larsen boomed.

". . . But Merritt and I have had remarkable success in telepathy."

"Telepathy? You and Merritt?" Nils' face was beet-red. "Another hoax, Corman?"

"Just because I made a harmless jest," Corman said, looking contrite, "you are becoming almost paranoid, Larsen. Relax, I have no intention of giving a demonstration, even though we've had almost unbelievable accuracy in transmission from my house to his."

It was impossible for Nils to refuse the bait. I looked at young Kahn, who sat next to me at the meeting, and we couldn't help grinning. Only six weeks since the cockroach fiasco, when Corman had seemed to make the insects, neatly clad in boots and harnesses, perform as if intelligent, to the extent of spelling out words with their bodies, and here was Nils ready for a rematch. Well, he was a top experimenter, and Corman would have to go some to fool him again.

"Just what did you transmit?" Larsen demanded. "Some of those vague diagrams, which when topologically equivalent are hailed as triumphs of telepathy. A thinks of a square, and B produces a lopsided rhomboid —lo, a fine datum!"

"No pictures," Corman said. "Just integers from one to ten. I've been able to think of any sequence of these, and Merritt, two hundred yards away, is able to write them down."

"Sure," Larsen snapped, "I could think of fifty ways

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the two houses might establish communication. Radio, black light; hell, Merritt could turn a good directional microphone towards your place, and pick up whispers."

"As I've said," Corman replied, puffing at his smoke, "you're getting quite paranoid. Why not ask Merritt?"

"He's your best friend; do I have to ask?"

"Why, Nils," Merritt said. "Don't you trust me, either?"

"With a million dollars, or even a new particle—but with tricks, never!"

Merritt patted his dog, a bright-eyed dachs, longer than a dull weak end. It wagged all over.

"Nip him," he told the animal, but it only wagged harder as Larsen walked over and gave it a pat.

"I trust Eulenspiegel here more than either of you." He stared at each man in turn, then added: "You want to play tricks, hey? This time you get fooled. If you can transmit the series of numbers *I* want, under *my* conditions, I buy dinner for the whole Committee. If not, you and Merritt pay. What do you say to that?"

"Depends on the conditions," Corman said, grinning at Merritt, who merely cocked his head quizzically.

"Right now," Larsen snapped. "Corman stays here, in this building, and Merritt goes two hundred yards away, into the parking lot. We can see from the window that he's there. And I search both of them; they could have miniature radios, the—." The epithet was in Swedish, I think, and sounded highly insulting, but Corman just smiled.

"That's pretty strict," old Professor Martin said. "Especially for something as erratic as telepathy."

"Telepathy!" Larsen cried. "We all know better. When we get them like this, with no funny gadgets, they'll be lucky if any two of the numbers agree."

"It's all right with me," Corman said, to my surprise. I'd expected him to refuse. It had to be a trick, and how could they work it in such circumstances?

"You agree?" Larsen said, taken aback.

"With one reservation. I do have to be alone. Telepathy requires the most delicate and concentrated thought. Oh," he added, as Nils glared in suspicion, "you can put me in any room on this side of the place—the one that does not even face the parking lot."

Larsen reflected for a moment; he was considering every angle.

"First, I search," he said finally. And he did, with great care. There was no radio, no signal lamp, nothing that could have been used even with the two men in sight of each other. A similar examination of Merritt's pockets was equally negative.

"You can go to the parking lot," Larsen told Merritt, and he left, followed by Eulenspiegel, rejoicing at the prospect of a walk.

When Merritt was in the center of the lot faintly lighted by a big sodium lamp overhead, Nils ushered Corman into a small room. Most of the building, including our conference room, was between Merritt and Corman. The room had one tiny window, which was open a few inches. It was not big enough for even a dwarf to pass through. And eighteen of us watched the one door.

Going off by himself, Larsen wrote twelve numbers on a bit of paper, and showed it to Professor Martin, who made a copy which we all inspected.

"You can start computing their chances of matching these," Larsen grinned. "A dozen integers chosen at random, all less than eleven." He walked to the door of the room, slipped the paper under it, and said loudly: "Use your lighter to read these, and transmit them if you can. I'm looking forward to that dinner!"

There was a faint rustling sound inside as Corman picked up the paper. We listened, but heard nothing else. After almost ten minutes, when we were getting impatient, Corman came out.

"Merrit will be here with the results immediately," he announced, with perfect confidence, and Larsen gulped, his face going greenish.

"Merritt never left the lot," he said weakly. "I watched."

"That's right," Corman agreed. "He didn't have to. It's a very short distance for thought transmission." His eyes were twinkling.

A moment later Merritt returned. He tried to hand the paper he carried to Dr. Wallace, but Larsen snatched it himself. As he read the scribbled list of numbers, his jaw fell open. Old Martin took the slip from his hands, and compared it with our copy.

"Identical," he said laconically.

Larsen was squirming with annoyance.

"It's still a trick!" he roared. "Telepathy, hell!"

"If it's a trick," Wallace said, "let me in on it, Nils. You had everything going for you. No warning; no equipment—it beats me."

"I'll see you at dinner, gentlemen," Corman squeaked. He put one hand on Merritt's shoulder, and the two men left. Larsen was gobbling with fury; the rest of us were baffled, but amused. None of us had any increased confidence in telepathy.

Corman never did tell Larsen, but the other scientists got the real story, which to their credit, they kept to themselves for several weeks, until Nils almost burst.

It was another hoax, of course. Between Merritt, Corman—and Eulenspiegel. Corman's cigarette holder held a silent dog whistle, and the dach had been easily trained to bark softly at every blast. In the little room, a mere two hundred yards away, and with an open window, all Corman had to do was play the number sequence on the whistle. In the parking lot, Merritt merely recorded the number of barks in each block of the message.

I'm not sure it will be safe to be around when Larsen gets the word. ■

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THE ETHICAL ENGINEER

Conclusion. On a really rugged, primitive world, in a thoroughly fouled-up culture — it turns out that a highly moral man is very unethical, and a highly ethical man is completely amoral!

By HARRY HARRISON

ILLUSTRATED BY JOHN SCHOENHERR

SYNOPSIS

JASON dinALT has had his fill of PYRRANS and the constant battle for survival on their death world. The two human groups have reached a reluctant armed truce and the battle against the native life forms is growing easier. But META cannot understand Jason's growing discomfort, and she has an argument with him just before a strange spaceship lands. Because he is angry and fed up with PYRRUS Jason allows himself to be captured by MIKAH SAMON who is piloting the ship, and whom Jason mistakingly believes to be a policeman.

Once in space Jason discovers his error and regrets the subconscious impulse to leave Pyrrus that allowed him to be captured. Mikah is a zealot who feels that he has a moral mission in life to cure all the ills that human society is heir to. He is unflinchingly narrow-minded in outlook. In order to escape Mikah—and the rigged death-sentence trial he is being returned to CASSYLIA to face—Jason sabotages the ship. He ruins the controls so that the spaceship will be forced to land on a nearby planet, but does too good a job and the ship is wrecked. Jason is knocked out in the crash landing and saved from certain death by Mikah. They are captured at once by the gruesomely armored CH'AKA and join his gang of slaves.

Life on this backwater planet appears to be short, brutal and nasty. As slaves they struggle up and down a stretch of shoreline desert, booted on by Ch'aka and living very much like animals in this dim version of a stone-age culture that the human colonists have sunk to. Since Ch'aka has all the weapons and know-how, Jason resigns himself to a short interim of slaveship while he learns the local ropes. When Mikah is sold to another slaver he is unable to interfere. Jason befriends IJALE, a female slave, and learns from her that this is a dog-eat-dog society with selfishness as the only motivation, and the only way one can rise in life is to kill the person whose job one wants. Armed with this knowledge and a sharpened animal horn Jason unsuccessfully attempts to assassinate Ch'aka and finally defeats him in a desperate hand-to-hand combat. He takes the dead man's armor and weapons and becomes the new Ch'aka.

Jason discovers that Mikah has been sold to the D'ZERTANOJ, a mysterious group who live in the inland desert and appear to have at least an iron-age culture since they trade crossbows and fire-makers to the slave holders. Still feeling indebted to Mikah for saving his life, Jason contacts the D'zertanoj in an attempt to buy Mikah back. But he is tricked by their ancient leader, EDIPON, and after a short battle is captured with his slaves. They are all loaded aboard a caro, *a large and clumsy steam-powered wagon, and driven off into the desert. Jason fights, but like the others he is forcefully fed a dark liquid that is either an anesthetic or a poison, and loses consciousness.*

Part 2

VII

"Drink some more of this," the voice said, and cold water splashed on Jason's face and some of it trickled down his throat making him cough. Something hard was pressing into his back and his wrists hurt. Memory seeped back slowly, the fight, the capture and the potion that had been forced upon him. When he opened his eyes he saw a flickering yellow lamp overhead, hung from a chain. He blinked at it and tried to gather enough energy to sit up. A familiar face swam in front of the light and Jason squinted his eyes at it and groaned.

"Is that you Mikah—or are you just part of a nightmare?"

"There is no escape from justice, Jason. It is I, and I have some grave questions to put to you."

Jason groaned again. "You're real all right. Even in a nightmare I wouldn't dare dream up any lines like that. But before the questions, how about telling me a thing or two about the local setup, you should know something since you have been a slave of the D'zertanoj longer than I have." Jason realized that the pain in his wrists came from heavy iron shackles. A chain passed through them and was stapled to a thick wooden bar on which his head had been resting. "Why the chains—and what is the local hospitality like?"

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Mikah resisted the invitation to impart any vital information and returned irresistibly to his own topic.

"When I saw you last you were a slave of Ch'aka, and tonight you were brought in with the other slaves of Ch'aka and chained to the bar while you were unconscious. There was an empty place next to mine and I told them I would tend you if they placed you there, and they did. Now there is something I must know. Before they stripped you I saw that you were wearing the armor and helmet of Ch'aka. Where is the man—what happened to him?"

"Me Ch'aka," Jason rasped, and burst out coughing from the dryness in his throat. He took a long drink of water from the bowl. "You sound very vindictive, Mikah you old fraud. Where is all the turn-the-other-cheek stuff now? Don't tell me you could possibly hate the man just because he hit you on the head, fractured your skull and sold you down the river as a slave reject? In case you have been brooding over this injustice you can now be cheered because the evil Ch'aka is no more. He is buried in the trackless wastes and after all the applicants were sifted out I got the job."

"You killed him?"

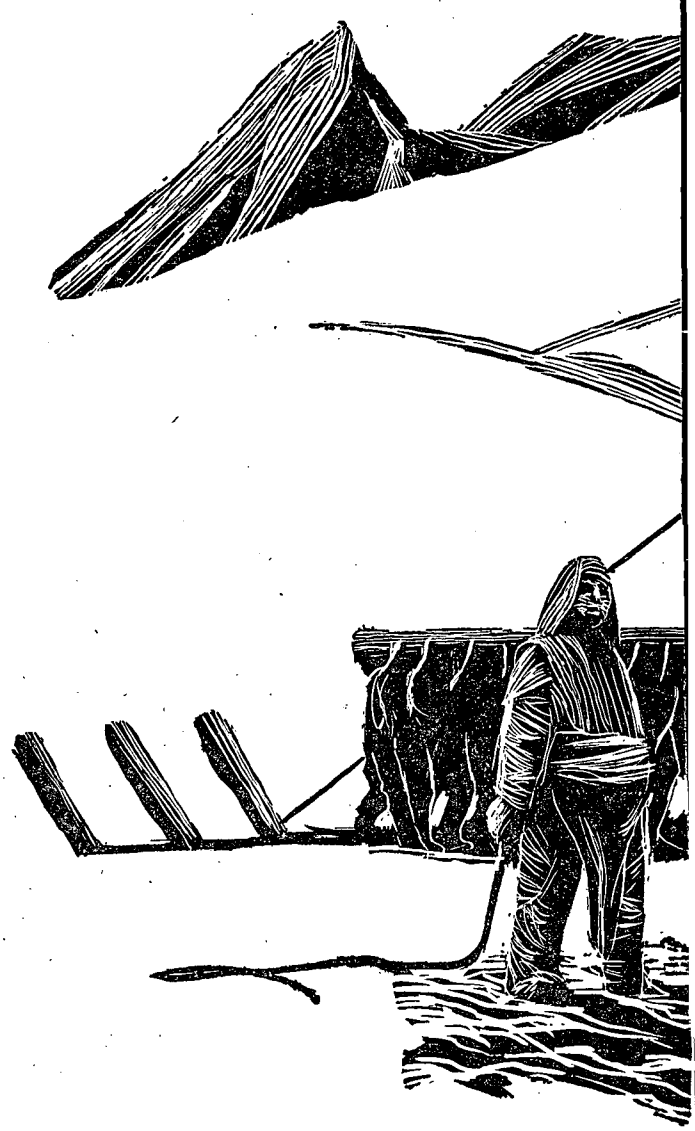
"In a word—yes. And don't think that it was easy since he had all the advantages and I possessed only my native ingenuity, which luckily proved to be enough. It was touch and go for a while because when I tried to assassinate him in his sleep—"

"You *what*?" Mikah Samon hissed.

"Got to him at night. You don't think anyone in his right mind would tackle a monster like that face-to-face do you? Though it ended up that way, since he had some neat gadgets for keeping track of people in the dark. Briefly, we fought, I won, I became Ch'aka, though my reign was neither long nor noble. I followed you as far as the desert where I was neatly trapped by a shrewd old bird name of Edipon who demoted me back to the ranks and took away all my slaves as well. Now that's my story. So tell me yours, where we are, what goes on here?"

"Assassin! Slave holder!" Mikah reared back, as far as he could under the restraint of the chain, and pointed the finger of judgment at Jason. "Two more charges must be added to your role of infamy. I sicken myself, Jason, that I could ever have felt sympathy for you and tried to help you. I will still help you, but only to stay alive so that you may be taken back to Cassylia for trial and execution."

"I like that example of fair and impartial justice—trial *and* execution." Jason coughed again and drained the bowl of water. "Didn't you ever hear of presumed innocence until proven guilty? It only happens to be the mainstay of all jurisprudence. And how could you possibly justify trying me on Cassylia for actions that occurred on this planet—that aren't crimes here? That's like taking a cannibal away from his tribe and executing him for anthropophagy."



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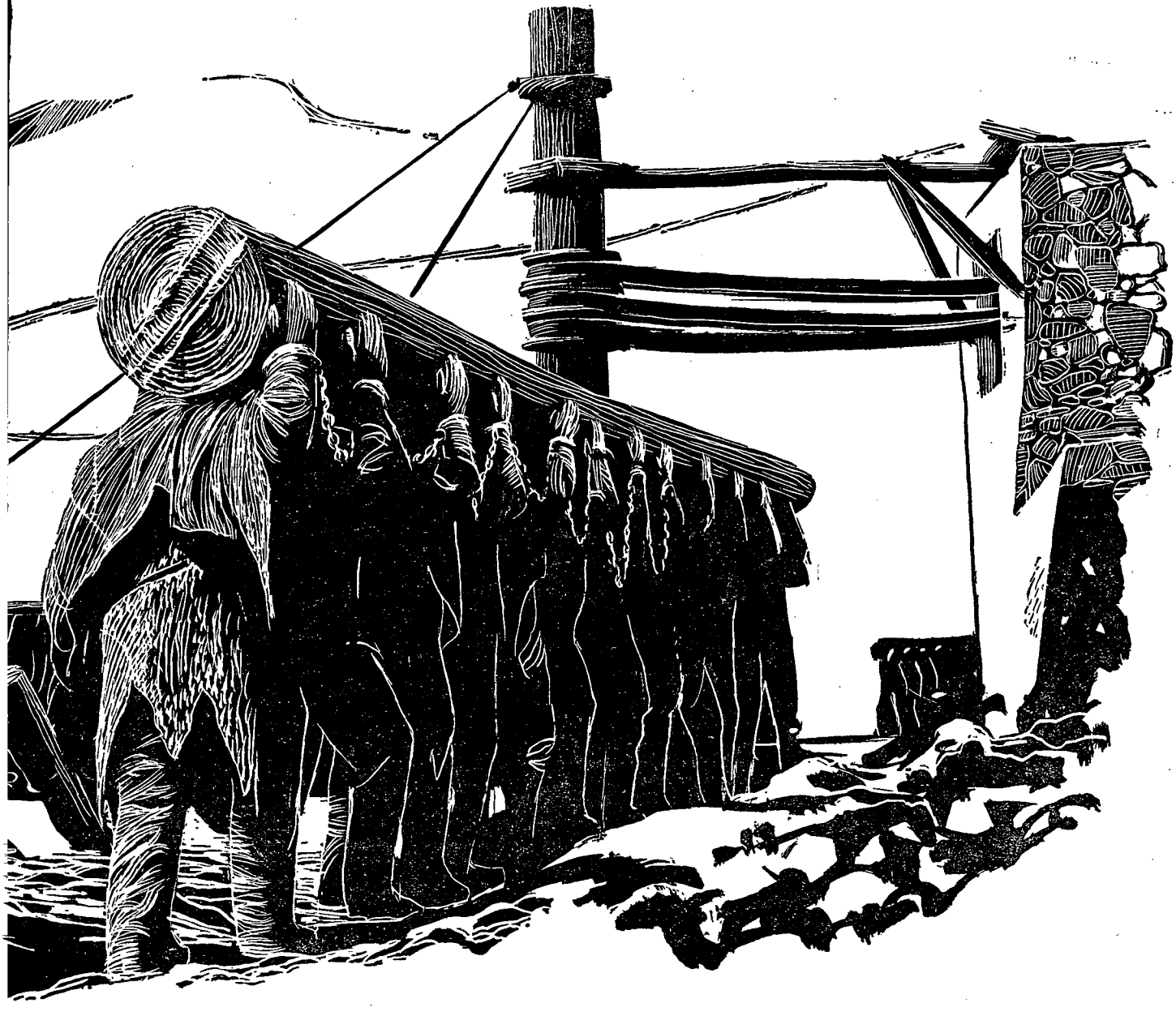

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"What would be wrong with that? The eating of human flesh is a crime so loathsome I shudder to think of it. Of course a man who does that must be executed."

"If he slips in the back door and eats one of your relatives, you certainly have grounds for action. But not if he joins the rest of his jolly tribe for a good roast of enemy. Don't you see the obvious point here—that human conduct can only be judged in relation to its environment? Conduct is relative. The cannibal in his society is just as moral as the churchgoer in yours."

"Blasphemer! A crime is a crime! There are moral laws that stand above all human society."

"Oh no there are not, that's just the point where your medieval morality breaks down. All laws and ideas are historical and relative, *not* absolute. They are relevant to their particular time and place and taken out of context they lose their importance. Within the context of this grubby society I acted in a most straightforward and honest manner. I attempted to assassinate my master—which is the only way an ambitious boy can get ahead in this hard world, and which was undoubtedly the way Ch'aka himself got the job in the first place. Assassination didn't work but combat did, and the results were the same. Once in power I took good care of my slaves, though of course they didn't appreciate it since they didn't want good care, they only wanted my job, that being the law of the land. The only thing I really did wrong was to not live up to my obligations as a slave holder and keep them marching up and down the beaches forever. Instead I came looking for you and was trapped and broken back to slavery where I belong for pulling such a stupid trick."

The door crashed open and harsh sunlight streamed into the windowless building. "On your feet slaves!" a D'zertano shouted in through the opening.

A chorus of shufflings and groans broke out as the men stirred to life. Jason could see now that he was one of twenty slaves shackled to the long bar, apparently the entire trunk of a good-sized tree. The man chained at the far end seemed to be a leader of sorts because he cursed and goaded the others to life. When they were all standing he snapped his commands in a hectoring tone of voice.

"Come on, come on, first come best food. And don't forget your bowls, put them away so they can't drop out, remember nothing to eat or drink all day unless you have a bowl. And let's work together today, everyone pull his weight, that's the only way to do it. That goes for all you men, specially you new men. Give them a day's work here and they give you a day's food . . ."

"Oh shut up!" someone shouted.

". . . And you can't complain about that," the strawboss whined on, unperturbed. "Now altogether . . . *one* . . . bend down and get your hands around the bar, get a good grip and . . . *two* . . . lift it clear of the ground, that's the way. And . . . *three* . . . stand up and out the door we go."

They shuffled out into the sunlight and the cold wind of dawn bit through his Pyrran coverall and the remnants of Ch'aka's leather trappings that Jason had been allowed to keep. His captors had torn off the claw-studded feet but not bothered the wrappings underneath, so they hadn't found his boots. This was the only bright spot on an otherwise unlimited vista of blackest gloom. Jason tried to be thankful for small blessings, but only shivered some more. As soon as possible this situation had to be changed since he had already served his term as slave on this backwoods planet and was cut out for better things.

On order the slaves lined up against the walls of the yard. Presenting their bowls like scruffy penitents they accepted dippers of lukewarm soup from another slave who pushed along a wheeled tub of the stuff: he was chained to the tub. Jason's appetite vanished when he tasted the sludge. It was *kreno* soup, and the desert tubers tasted even worse—he hadn't thought it was possible—when served up in a broth. But survival was more important than fastidiousness, so he gulped the evil stuff down.

Breakfast over they marched out the gate into another compound and fascinated interest displaced all of Jason's concerns. In the center of the yard was a large capstan into which the first group of slaves were already fitting the end of their bar. Jason's group, and the two others shuffled into position and seated their bars, making a four spoked wheel out of the capstan. An overseer shouted and the slaves groaned and threw their weight against the bars until they shuddered and began to turn, then trudging slowly they kept the wheel moving. Once this slogging labor was under way Jason turned his attention to the crude mechanism that they were powering.

A vertical shaft from the capstan turned a creaking wooden wheel that set a series of leather belts into motion. Some of them vanished through openings into a large stone building, while the strongest strap of all turned the rocker arm of what could only be a counterbalanced pump. This all seemed like a highly inefficient way to go about pumping water since there certainly must be natural springs and lakes somewhere around. The pungent smell that filled the yard was hauntingly familiar, and Jason had just reached the conclusion that water couldn't be the object of their labors when a throaty gurgling came from the standpipe of the pump and a thick black stream bubbled out.

"Petroleum—of course!" Jason enthused out loud, then bent his attentions to pushing when the overseer gave him an ugly look and cracked his whip menacingly.

This was the secret of the D'zertanoj, and the source of their power. Mountains were visible nearby, and hills, towering above the surrounding walls. The captured slaves had been drugged so they would not even know in which direction they had been brought to this hidden site, or how long the trip was. Here in this guarded valley they labored to pump the crude oil that their masters used to power their big desert wagons. Or did they use crude oil for this? The petroleum was gurgling out in a solid stream now, and running down an open trough that van-

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ished through the wall into the same building as the turning belts. And what barbaric devilishness went on in there? A thick chimney crowned the building and produced clouds of black smoke, while from the various openings in the wall came a tremendous stench that threatened to lift the top off his head.

At the same moment that he realized what was going on in the building a guarded door was opened and Edipon came out, blowing his sizable nose in a scrap of rag. The creaking wheel turned and when its rotation brought Jason around again he called out to him.

"Hey, Edipon, come over here. I want to talk to you. I'm the former Ch'aka, in case you don't recognize me out of uniform."

Edipon gave him one look, then turned away dabbing at his nose. It was obvious that slaves held no interest for him, no matter what their position had been before their fall. The slavedriver ran over with a roar, raising his whip, while the slow rotation of the wheel carried Jason away. He shouted back over his shoulder.

"Listen to me—I know a lot and can help you." Only a turned back for an answer and the whip was already whistling down. It was time for the hard sell. "You had better hear me—because I know that *what comes out first is best.* Yeow!" This last was involuntary as the whip landed.

Jason's words were without meaning to the slaves as well as the overseer who was raising his whip for another blow, but their impact on Edipon was as dramatic as if he had stepped on a hot coal. He shuddered to a halt and wheeled about, and even at this distance Jason could see that a sickly gray tone had replaced his normal browned color of his skin.

"*Stop the wheel!*" he shouted.

This unexpected command drew the startled attention of everyone. The gape-mouthed overseer lowered his whip while the slaves stumbled and halted and the wheel groaned to a stop. In the sudden silence Edipon's steps echoed loudly as he ran to Jason, halting a hand's breadth away, his lips drawn back from his teeth with tension as if he were prepared to bite.

"What was that you said?" He hurled the words at Jason while his fingers half-plucked a knife from his belt.

Jason smiled, looking and acting calmer than he felt. His barb had gone home, but unless he proceeded carefully so would Edipon's knife—into his stomach. This was obviously a very sensitive topic.

"You heard what I said—and I don't think you want me to repeat it in front of all these strangers. I know what happens here because I come from a place far away where we do this kind of thing all the time. I can help you. I can show you how to get more of the best, and how to make your *caro* work better. Just try me. Only unchain me from this bar first and let's get to some place private where we can have a nice chat."

Edipon's thoughts were obvious. He chewed his lip and looked hotly at Jason, fingering the edge of his knife. Jason only returned a smile of pure innocence and tapped his fingers happily on the bar, just marking time while he waited to be released. Yet in spite of the cold there was a rivulet of sweat trickling down his spine. He was gambling everything on Edipon's intelligence, that the man's curiosity would overcome the immediate desire to silence the slave who knew so much about things so secret, hoping that he would remember that slaves could always be killed, and that it wouldn't hurt to ask a few questions first. Curiosity won and the knife dropped back into the sheath while Jason let his breath out in a relieved sigh. It had been entirely too close, even for a professional gambler; his own life on the board was a little higher stakes than he enjoyed playing for.

"Release him from the bar and bring him to me," Edipon ordered, then strode agitatedly away. The other slaves watched wide-eyed as the blacksmith was rushed out, and with much confusion and shouted orders Jason's chain was cut from the bar where it joined the heavy staple.

"What are you doing?" Mikah asked, and one of the guards backhanded him to the ground. Jason just smiled and touched his finger to his lips as his chain was released and they led him away. He was free from bondage and he would stay that way if he could convince Edipon that he would be better off in some capacity other than dumb labor.

The room they led him to contained the first touches of decoration or self-indulgence that he had seen on this planet. The furniture was carefully constructed, with an occasional bit of carving to brighten it, and there was a woven cover on the bed. Edipon stood by a table, tapping his fingers nervously on the dark polished surface. "Lock him up," he ordered the guards, and Jason was secured to a sturdy ringbolt that projected from the wall. As soon as the guards were gone he stood before Jason and drew his knife. "Tell me what you know or I will kill you at once."

"My past is an open book to you, Edipon. I come from a land where we know all the secrets of nature—"

"What is the name of this land? Are you a spy from Appsala?"

"I couldn't very well be one since I have never heard of the place." Jason pulled at his lower lip, wondering just how intelligent Edipon was, and just how frank he could be with him. This was no time to get tangled up in lies about the planetary geography: it might be best to try him on a small dose of the truth. "If I told you I came from another planet, another world in the sky up among the stars, would you believe me?"

"Perhaps. There are many old legends that our forefathers came from a world beyond the sky, but I have always dismissed this as religious drivel, fit only for women."

"In this case the girls happen to be right. Your planet was settled by men whose ships crossed the emptiness of

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space as your *caroj* pass over the desert. Your people have forgotten about that and lost the science and knowledge you once had, but in other worlds the knowledge is still held."

"Madness!"

"Not at all, it is science, though many times confused as being the same thing. I'll prove my point. You know that I could never have been inside of your mysterious building out there, and I imagine you can be sure no one has told me its secrets. Yet I'll bet you that I can describe fairly accurately what is in there—not from seeing the machinery, but from knowing what must be done to oil in order to get the products you need. Do you want to hear?"

"Proceed," Edipon said, sitting on a corner of the table and balancing the knife loosely in his palm.

"I don't know what you call it, the device, but in the trade it is a pot still used for fractional distillation. Your crude oil runs into a tank of some kind, and you pipe it from there to a retort, some big vessel that you can seal airtight. Once it is closed you light a fire under the thing and try to get all the oil to an even temperature. A gas rises from the oil and you take it off through a pipe and run it through a condenser, probably more pipe with water running over it. Then you put a bucket under the open end of the pipe and out of it drips the juice that you burn in your *caroj* to make them move."

Edipon's eyes opened wider and wider while Jason talked until they stuck out of his head like boiled eggs. "Demon!" he screeched and tottered towards Jason with the knife extended. "You couldn't have seen, not through stone walls, yet only my family have seen, no others—I'll swear to that!"

"Keep cool, Edipon, I told you that we have been doing this stuff for years in my country." He balanced on one foot, ready for a kick at the knife in case the old man's nerves did not settle down. "I'm not out to steal your secrets, in fact they are pretty small potatoes where I come from since every farmer has a still for cooking up his own mash and saving on taxes. I'll bet I can even put in some improvements for you, sight unseen. How do you monitor the temperature on your cooking brew? Do you have thermometers?"

"What are thermometers?" Edipon asked, forgetting the knife for the moment, drawn on by the joys of a technical discussion.

"That's what I thought. I can see where your bootleg joyjuice is going to take a big jump in quality, if you have anyone here who can do some simple glassblowing. Though it might be easier to rig up a coiled bi-metallic strip. You're trying to boil off your various fractions, and unless you keep an even and controlled temperature you are going to have a mixed brew. The thing you want for your engines are the most volatile fractions, the liquids that boil off first like gasoline and benzene. After that you raise the temperature and collect kerosene for your lamps and so forth right on down the line until you have a nice mass of tar left to pave your roads with. How does that sound to you?"

Edipon had forced himself into calmness, though a jumping muscle in his cheek betrayed his inner tension. "What you have described is the truth, though you were wrong on some small things. But I am not interested in your thermometer nor in improving our water-of-power, it has been good enough for my family for generations and it is good enough for me . . ."

"I bet you think that line is original?"

". . . There is something that you might be able to do that would bring you rich rewards. We can be generous when needs be. You have seen our *caroj* and ridden on one, and seen me go into the shrine to intercede with the sacred powers to make us move. Can you tell me what power moves the *caroj*?"

"I hope this is the final exam, Edipon, because you are stretching my powers of extrapolation. Stripping away all the *shrines* and *sacred powers* I would say that you go into the engine room to do a piece of work with very little praying involved. There could be a number of ways of moving those barns, but let's think of the simplest. This is top of the head now, so no penalties if I miss any of the fine points.

"Internal combustion is out, I doubt if you have the technology to handle it, plus the fact there was a lot to do about the water tank and it took you almost an hour to get under way. That sounds like you were getting up a head of steam—the safety valve! I forgot about that. So it is steam. You go in, lock the door of course, then open a couple of valves until the fuel drips into the firebox, then you light it. Maybe you have a pressure gauge, or maybe you just wait until the safety valve pops to tell you if you have a head of steam. Which can be dangerous since a sticking valve could blow the whole works right over the mountain.

"Once you have the steam you crack a valve to let it into the cylinders and get the thing moving. After that you just enjoy the trip, of course making sure the water is feeding to your boiler all right, that your pressure stays up, your fire is hot enough, all your bearings are lubricated and the rest . . ."

Jason looked on astounded as Edipon did a little jig around the room, holding his robe up above his bony knees. Bouncing with excitement he jabbed his knife into the table top and rushed over to Jason and grabbed him by the shoulders, shaking him until his chain rattled.

"Do you know what you have done?" he asked. "Do you know what you have said?"

"I know well enough. Does this mean that I have passed the exam? Was I right?"

"I don't know if you are right or not, I have never seen the inside of one of the Appsalan devil-boxes." He danced around the room again. "You know more about their . . . what do you call it, *engine* . . . than I do. I have only spent my life tending them and cursing the people

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of Appsala who keep the secret from us. But you will reveal it to us! We will build our own engines and if they want water-of-power they will have to pay dearly for it."

"Would you mind being a little bit clearer," Jason pleaded. "I have never heard anything so confused in my entire life."

"I will show you, man from a far world, and you will reveal the Appsalan secrets to us. I see the dawn of a new day for Putl'ko arriving." He opened the door and shouted for the guards, and for his son, Narsisi, who arrived as they were unlocking Jason who recognized him as the same droop-eyed and sleepy looking D'zertano who had been helping Edipon to drive their ungainly vehicle.

"Seize this chain my son and keep your club ready to kill this slave if he makes any attempt to escape. Otherwise do not harm him, for he is very valuable. Come."

He tugged on the chain, but Jason only dug his heels in and did not move. They looked at him, astonished.

"Just a few things before we go. The man who is to bring the new day to Putl'ko is not a slave, let us get that straight before this operation goes any further. We'll work out something with chains or guards so I can't escape, but the slavery thing is out."

"But—you are not one of us, therefore you must be a slave."

"I've just added a third category to your social order. Employee. Though reluctant, I am still an employee, skilled labor, and I intend to be treated that way. Figure it out for yourself. Kill a slave and what do you lose? Very little if there is another slave in the pens that can push in the same place. But kill me and what do you get? Brains on your club—and they do you no good at all there."

"Say, Dad, does he mean I can't kill him?" Narsisi looked puzzled as well as sleepy.

"No, he doesn't mean that. He means if we kill him there is no one else that can do the work he is to do for us. I can understand him and I do not like it. There are only slaves and slavers, anything else is against the natural order. But he has us trapped between *satano* and the sandstorm so we must allow him some freedoms. Bring the slave now . . . I mean the employee . . . and we will see if he can do the things he has promised. If he does not, *I* will have the pleasure of killing him because I do not like his revolutionary ideas."

They marched single file to a locked and guarded building with immense doors, which were pulled open to reveal the massive forms of seven *caroj*.

"Look at them," Edipon hissed and tugged at his nose. "The finest and most beautiful of constructions, striking fear into our enemies' hearts, carrying us fleetly across the sands, bearing on their backs immense loads and only three of the things are able to move."

"Engine trouble?" Jason asked lightly.

Edipon grumbled, cursed and fumed under his breath and led the way to an inner courtyard where stood four

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immense black boxes painted with death-heads, splintered bones, fountains of blood and cabalistic symbols all of a sinister appearance.

"Those swine in Appsala take our water-of-power and give nothing in return. Oh yes, they let us use their engines, but after running for a few months the cursed things stop and will not go again, then we must bring them back to the city to exchange for a new one, and pay again and again."

"A nice racket," Jason said, looking at the sealed covering on the engines. "Why don't you just crack into them and fix them yourself, they can't be very complex."

"That is death!" Edipon gasped, and both D'zertanoj recoiled from the boxes at the thought. "We have tried that, in my father's father's day, since we are not superstitious like the slaves and know that these are man-made not god-made. However the tricky serpents of Appsala hide their secrets with immense cunning. If any attempt is made to break the covering horrible death leaks out and fills the air. Men who breathe the air die, and even those who are solely touched by it develop immense blisters and die in pain. The man of Appsala laughed when this happened to our people and after that raised the price even higher."

Jason circled one of the boxes, examining it with interest, trailing Narsisi behind him at the end of the chain. The thing was higher than his head and almost twice as long. A heavy shaft emerged through openings on opposite sides, probably the power takeoff for the wheels. Through an opening in the side he could see inset handles and two small colored disks, and above this were three funnel-shaped openings shaped and painted like mouths. By standing on tiptoe Jason looked on top but there was only a flanged, sooty opening that must be for attatchment of a smokestack. There was only one more opening, a smallish one in the rear, and no other controls on the garish container.

"I'm beginning to get the picture, but you will have to tell me how you work the controls."

"Death before that," Narsisi shouted. "Only my family—"

"Will you shut up!" Jason shouted right back. "Remember? You're not allowed to browbeat the help anymore. There are no secrets here. Not only that, but I probably know more about this thing than you do just by looking at it. Oil, water and fuel go in these three openings, you poke a light in somewhere, probably in that smoky hole under the controls, open one of those valves for fuel supply, another one is to make the engine go slower and faster, and the third is for your water feed. The disks are indicators of some kind." Narsisi paled and stepped back. "So keep the trap shut while I talk to your dad."

"It is as you say," Edipon pointed. "The mouths must always be filled and woebetide if they shall go empty for the powers will halt or worse. Fire goes in here as you guessed, and when the green finger comes forward this lever may be turned for motion. The next is for great speed or going slow. The very last is under the sign of the red finger, which when it points indicates need, and the handle must be turned and held until the finger retires. White breath comes from the opening in back. That is all there is."

"About what I expected," Jason muttered and examined the container wall, rapping it with his knuckles until it boomed. "They give you the minimum of controls to run the thing, so you won't learn anything about the basic principles involved. Without the theory you would never know what the handles control, or that the green indicator comes out when you have operating pressure or the red one when the water level is low in the boiler. Very neat. And the whole thing sealed up in a can and booby-trapped in case you have any ideas of going into business for yourself.

"The cover sounds like it is double walled, and from your description I would say that it has one of the vesicant war gases, like mustard gas, sealed inside there in liquid form. Anyone who tries to cut their way in will quickly forget their ambitions after a dose of that. Yet there must be a way to get inside the case and service the engine, they aren't just going to throw them away after a few months' use. And considering the level of technology displayed by this monstrosity I should be able to find the tricks and get around any other built-in traps. I think I'll take the job."

"Very well, begin."

"Wait a minute, boss, you still have a few things to learn about hired labor. There are always certain working conditions and agreements involved, all of which I'll be happy to list for you."

VIII

"What I do not understand is why you must have the other slave?" Narsisi whined. "To have the woman of course is natural, as well as to have quarters of your own, my father has given his permission. But he also said that I and my brothers are to help you, that the secrets of the engine are to be revealed to no one else."

"Then trot right over to him and get permission for the slave Mikah to join me in the work. You can explain that he comes from the same land that I do, and that your secrets are mere children's toys to him. And if dad wants any other reasons tell him that I need skilled aid, someone who knows how to handle tools and who can be trusted to follow directions exactly as given. You and your brothers have entirely too many ideas of your own about how things should be done, and a tendency to leave details up to the gods and have a good bash with the hammer if things don't work the way they should."

Narsisi retired, seething and mumbling to himself while Jason huddled over the oil stove planning the next step. It had taken most of the day to lay down logs for rollers and to push the sealed engine out into the sandy

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valley, far from the well site; open space was needed for any experiments where a mistake could release a cloud of war gas. Even Edipon had finally seen the sense of this, though all of his tendencies were to conduct the experiments with great secretiveness behind locked doors. He had granted permission only after skin walls had been erected to form an enclosure that could be guarded; it was only incidental that they acted as a much-appreciated windbreak.

And after much argument the dangling chains and shackles had been removed from Jason's arms and lightweight leg-irons substituted. He had to shuffle when he walked but his arms were completely free, a great improvement over the chains, even though one of the brothers kept watch with a cocked crossbow as long as Jason wasn't fastened down. Now he had to get some tools and some idea of the technical knowledge of these people before he could proceed, which would necessarily entail one more battle over their precious secrets.

"Come on," he called to his guard, "let's find Edipon and give his ulcers another twinge."

After his first enthusiasm the leader of the D'zertanoj was getting very little pleasure out of his new project.

"You have quarters of your own," he grumbled, "and the slave woman to cook for you, and I have just given permission for the other slave to help you. Now more requests—do you want to drain all the blood from my body?"

"Let's not dramatize too much. I simply want some tools to get on with my work, and a peek at your machine shop or wherever it is you do your mechanical work. I have to have some idea of the way you people solve mechanical problems before I can go to work on that box of tricks out there in the desert."

"Entrance is forbidden—"

"Regulations are snapping like straws today, so we might as well go on and finish off a few more. Will you lead the way?"

The guards were reluctant to open the refinery building gates to Jason, and there was much rattling of keys and worried looks. A brace of elderly D'zertanoj, stinking of oil fumes, emerged from the interior and joined in a shouted argument with Edipon whose will finally prevailed. Chained again, and guarded like a murderer, Jason was begrudgingly led into the dark interior, the contents of which was depressingly anticlimatic.

"Really from rubeville," Jason sneered and kicked at the boxful of hand-forged and clumsy tools. The work was of the crudest, the product of a sort of neolithic machine age. The distilling retort had been laboriously formed from sheet copper and clumsily riveted together. It leaked mightily as did the soldered seams on the hand-formed pipe. Most of the tools were blacksmith's tongs and hammers for heating and beating out shapes on the anvil. The only things that gladdened Jason's heart were the massive drill press and lathe that worked off the slave-power drive belts. In the tool holder of the lathe was clamped a chip of some hard mineral that did a good enough job of cutting the forged iron and low-carbon steel. Even more cheering was the screw-thread advance on the cutting head that was used to produce the massive nuts and bolts that secured the *caroj* wheels to their shafts. It could have been worse. Jason sorted out the smallest and handiest tools and put them aside for his own use in the morning. The light was almost gone and there would be no more work this day.

They left, in armed procession, as they came, and a brace of brothers showed him to the kennellike room that was to be his private quarters. The heavy bolt thudded shut in the door behind him and he winced at the thick fumes of half-burnt kerosene through which the light of the single-wick lamp barely penetrated. Ijale crouched over the small oil stove cooking something in a pottery bowl. She looked up and smiled hesitatingly at Jason, then turned quickly back to the stove. Jason walked over, sniffed and shuddered.

"What a feast! *Kreno* soup, and I suppose followed by fresh *kreno* and *kreno* salad. Tomorrow I see about getting a little variety into the diet."

"Ch'aka is great," she whispered without looking up. "Ch'aka is powerful . . ."

"Jason is the name, I lost the Ch'aka job when they took the uniform away."

". . . Jason is powerful to work charms on the D'zertanoj and makes them do what he will. His slave thanks you."

He lifted her chin and the dumb obedience in her eyes made him wince. "Can't we forget about the slavery bit? We are in this thing together and we'll get out of it together."

"We will escape, I knew it. You will kill all the D'zertanoj and release your slaves and lead us home again where we can march and find *kreno* far from this terrible place."

"Some girls are sure easy to please. That is roughly what I had in mind, except when we get out of here we are going in the other direction, as far away from your *kreno* crowd as I can get."

Ijale listened attentively, stirring the soup with one hand and scratching inside her leather wrappings with the other. Jason found himself scratching as well, and realized from sore spots on his hide that he had been doing an awful lot of this since he had been dragged out of the ocean of this inhospitable planet.

"Enough is enough!" he exploded and went over and hammered on the door. "This place is a far cry from civilization as I know it, but that is no reason why we can't be as comfortable as possible." Chains and bolts rattled outside the door and Narsisi pushed his gloom-ridden face in.

"Why do you cry out? What is wrong?"

"I need some water, lots of it."

"But you have water," Narsisi said, puzzled, and

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pointed to a stone crock in the corner. "There is water there enough for days."

"By your standards, Nars old boy, not mine. I want at least ten times as much as that and I want it now. And some soap, if there is such stuff in this barbaric place."

There was a good deal of argument involved, but Jason finally got his way with the water by explaining it was needed for religious rites to make sure that he would not fail in the work tomorrow. It came in a varied collection of containers along with a shallow bowl full of powerful soft soap.

"We're in business," he chortled. "Take your clothes off, I have a surprise for you."

"Yes, Jason," Ijale said, smiling happily.

"You're going to get a bath. Do you know what a bath is?"

"No," she said, and shuddered. "It sounds evil."

"Over here and off with the clothes," he ordered, poking at a hole in the floor. "This should serve as a drain, at least the water went away when I poured some into it."

The water was warm from the stove, yet Ijale still crouched against the wall and shuddered when he poured it over her. She screamed when he rubbed the slippery soap into her hair, and he continued with his hand over her mouth so that she wouldn't bring in the guards. He rubbed the soap into his own head, too, and it tingled delightfully as it soaked through to his scalp. Some of it was in his ears, muffling them, so the first intimation he had that the door was opened was the sound of Mikah's hoarse shout. He was standing in the doorway, finger pointed and shaking with wrath, Narsisi was standing behind him, peering over his shoulder with fascination at this weird religious rite.

"Degradation!" Mikah thundered. "You force this poor creature to bend to your will, humiliate her, strip her clothes from her and gaze upon her though you are not united in lawful wedlock." He shielded his eyes from sight with a raised arm. "You are evil, Jason, a demon of evil and must be brought to justice—"

"*Out!*" Jason roared, and spun Mikah about and started him through the door with one of his practiced Ch'aka kicks. "The only evil here is in your mind, you snooping scut. I'm giving the girl the first scrubbing of her life and you should be giving me a medal for bringing sanitation to the natives instead of howling like that." He pushed them both out the door and shouted at Narsisi. "I wanted this slave, but not *now!* Lock him up until morning then bring him back." He slammed the door and made a mental note to get hold of a bolt to be placed on this side as well.

There were more *kreno* for breakfast but Jason was feeling too good physically to mind. He was scrubbed raw and clean and the itching was gone even from his sprouting beard. The metalcloth of his Pyrran coverall had dried almost as soon as it had been washed so he was wearing clean clothes as well. Ijale was still recovering from the traumatic effects of her bath, but she looked positively attractive with her skin cleaned and her hair washed and combed a bit. He would have to find some of the local cloth for her since it would be a shame to ruin the good work by letting her get back into the badly cured skins she was used to wearing. It was with a sensation of positive good feeling that he bellowed for the door to be opened and stamped through the cool morning to his place of labor. Mikah was already there, looking scruffy and angry as he rattled his chains; Jason gave him the friendliest of smiles that only rubbed salt into the other's moral wounds.

"Leg-irons for him, too," Jason ordered, "And do it fast. We have a big job to do today." He turned back to the sealed engine, rubbing his hands together with anticipation.

The concealing hood was made of thin metal that could not hide many secrets. He carefully scratched away some of the paint and discovered a crimped and soldered joint where the sides met, but no other revealing marks. After an hour spent tapping all over with his ear pressed to the metal he was sure that the hood was just what he had thought it was when he first examined the thing—a double-walled metal container filled with liquid. Puncture it and you were dead. It was there merely to hide the secrets of the engine, and served no other function. Yet it had to be passed to service the steam engine—or did it? The construction was roughly cubical, and the hood covered only five sides. What about the sixth, the base?

"Now you're thinking, Jason," he chortled to himself, and knelt down to examine it. A wide flange, apparently of cast iron, projected all around, and was penetrated by four large bolt holes. The protective casing seemed to be soldered to the base, but there must be stronger concealed attachments because it would not move even after he carefully scratched away some of the solder at the base. Therefore the answer simply had to be on the sixth side.

"Over here, Mikah," he called, and the man detached himself reluctantly from the warmth of the stove and shuffled up. "Come close and look at this medieval motive-power while we talk, as if we are discussing business. Are you going to co-operate with me?"

"I do not want to, Jason. I am afraid that you will soil me with your touch, as you have others."

"Well you're not so clean now—"

"I do not mean physically."

"Well I do. You could certainly do with a bath and a deep shampoo. I'm not worried about the state of your soul, you can battle that out on your own time. But if you work with me. I'll find a way to get us out of this place and to the city that made this engine, because if there is a way off this planet we'll find it only in the city."

"I know that, yet still I hesitate—"

"Small sacrifices now for the greater good later. Isn't the entire purpose of this trip to get me back to justice?

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You're not going to accomplish that by rotting out the rest of your life as a slave."

"You are the devil's advocate the way you twist my conscience—yet what you say is true. I will help you here so that we can escape."

"Fine. Now get to work. Take Narsisi and have him round up at least three good-sized poles, the kind we were chained to in the pumping gang. Bring them back here along with a couple of shovels."

Slaves carried the poles only as far as the outside of the skin walls, since Edipon would not admit them inside, and it was up to Jason and Mikah to drag them laboriously to the site. The D'zertanoj, who never did physical labor, thought it very funny when Jason suggested that they help. Once in position by the engine, Jason dug channels beneath it and forced the bars under. When this was done he took turns with Mikah in digging out the sand beneath until the engine stood over a pit supported only by the bars. Jason let himself down and examined the bottom of the machine. It was smooth and featureless.

Once more he scratched away the paint with careful precision, until it was cleared around the edges. Here the solid metal gave way to solder and he picked at this until he discovered that a piece of sheet metal had been soldered at the edges and fastened to the bedplate. "Very tricky, these Appsalanoj," he chortled and attacked the solder with a knife blade. When one end was loose he slowly pulled the sheet of metal away, making positive that there was nothing attached to it, nor that it had been booby-trapped in any way. It came off easily enough and clanged down into the pit. The revealed surface was smooth metal, featureless and hard.

"Enough for one day," Jason said, climbing out of the pit and brushing off his hands. It was almost dark. "We've accomplished enough for now and I want to think a bit before I go ahead. So far luck has been on our side, but I don't think it should be this easy. I hope you brought your suitcase with you, Mikah, because you're moving in with me."

"Never! A sink of sin, depravity—"

Jason looked him coldly in the eye and with each word he spoke he stabbed him in the chest with his finger to drive home the point. "You are moving in with me because that is essential to our plans. And if you stop referring to my moral weaknesses I'll stop talking about yours. Now come on."

Living with Mikah Samon was trying, but barely possible. He made Ijale and Jason go to the far wall and turn their backs and promise not to look while he bathed behind a screen of skins. Jason did this but exacted a small revenge by telling Ijale jokes so that they tittered together and Mikah would be sure they were laughing at him. The screen of skins remained after the bath, and was reinforced, and Mikah retired behind it to sleep. Their food still consisted only of *kreno* and Jason shuddered while he admitted that he was actually growing used to them.

The following morning, under the frightened gaze of his guards, Jason tackled the underside of the baseplate. He had been thinking about it a good part of the night and he put his theories to the test at once. By pressing hard on a knife he could make a good groove in the metal. It was not as soft as the solder, but seemed to be some simple alloy containing a good percentage of lead. What could it be concealing? Probing carefully with the point of the knife he covered the bottom in a regular pattern. The depth of the metal was uniformly deep except in two spots where he found irregularities, they were on the midline of the rectangular base, and equidistant from the ends and sides. Picking and scraping he uncovered two familiar looking shapes each as big as his head.

"Mikah. Get down in this hole and look at these things. Tell me what you think they are."

Mikah scratched his beard. "They're still covered with this metal, I can't be sure—"

"I'm not asking you to be sure of anything—just tell me what they make you think of."

"Why . . . big nuts of course. Threaded on the ends of bolts. But they are so big—"

"They would have to be if they hold the entire metal case on. I think we are getting very close now to the mystery of how to open the engine—and this is the time to be careful. I still can't believe it is as easy as this to crack the secret. I'm going to whittle a wooden template of the nut, then have a wrench made. While I'm gone you stay down here and pick all the metal off the bolt and out of the screw threads. I can put off doing it while we think this thing through, but sooner or later I'm going to have to take a stab at turning one of those nuts. And I find it very hard to forget about that mustard gas."

Making the wrench put a small strain on the local technology and all of the old men who enjoyed the title of Masters of the Still went into consultation over it. One of them was a fair blacksmith and after a ritual sacrifice and a round of prayers he shoved a bar or iron into the charcoal and Jason pumped the bellows until it glowed white hot. With much hammering and cursing it was laboriously formed into a sturdy open-end wrench with an offset head to get at the countersunk nuts. Jason made sure that the opening was slightly undersized, then took the untempered wrench to the work site and filed the jaws to an exact fit. After being reheated and quenched in oil he had the tool that he hoped would do the job.

Edipon must have been keeping track of the work progress because he was waiting near the engine when Jason returned with the completed wrench.

"I have been under," he announced, "and have seen the nuts that the devilish Appsalanoj have concealed within solid metal. Who would have suspected! It still seems to me impossible that one metal could be hidden within another, how could that be done?"

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"Easy enough. The base of the assembled engine was put into a form and the molten covering metal poured into it. It must have a much lower melting point than the steel of the engine so there would be no damage. They just have a better knowledge of metal technology in the city and counted upon your ignorance."

"Ignorance! You insult—"

"I take it back. I just meant they thought they could get away with the trick, and since they didn't they are the stupid ones. Does that satisfy you?"

"What do you do next?"

"I take off the nuts and when I do there is a good chance that the poison-hood will be released and can simply be lifted off."

"It is too dangerous for you to do, the fiends may still have other traps ready when the nut is turned. I will send a strong slave to turn them while we watch from a distance, his death will not matter."

"I'm touched by your concern for my health, but as much as I would like to take advantage of the offer, I cannot. I've been over the same ground and reached the reluctant conclusion that this is one job of work that I have to do myself. Taking off those nuts looks entirely too easy, and that's what makes me suspicious. I'm going to do it and look out for any more trickery at the same time—and that is something that only I can do. Now I suggest you withdraw with the troops to a safer spot."

There was no hesitation about leaving, footsteps rustled quickly on the sand and Jason was alone. The leather walls flapped slackly in the wind and there was no other sound. Jason spat on his palms, controlled a slight shiver and slid into the pit. The wrench fitted neatly over the nut, he wrapped both hands around it and, bracing his leg against the pit wall, began to pull.

And stopped. Three turns of thread on the bolt projected below the nut, scraped clean of metal by the industrious Mikah. Something about them looked very wrong but he didn't know quite what.

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"Mikah," he shouted, and had to call loudly two more times before his assistant poked his head tentatively around the screen. "Nip over to the petroleum works and get me one of their bolts threaded with a nut, any size, it doesn't matter."

Jason warmed his hands by the stove until Mikah returned with the oily bolt, then waved him out to rejoin the others. Back in the pit he held it up next to the protruding section of Appsalan bolt and chortled with joy. The threads on the angle bolt were canted at a slightly different angle: where one ran up, the other ran down. The Appsalan threads had been cut in reverse, with a lefthand thread.

Throughout the galaxy there existed as many technical and cultural differences as there were planets, yet one of the few things they all had in common, inherited from their terrestrial ancestors, was a uniformity of thread. Jason had never thought about it before, but when he mentally ran through his experiences on different planets he realized that they were all the same. Screws went into wood, bolts went into threaded holes and nuts all went onto bolts when you turned them with a clockwise motion. Counterclockwise removed them. In his hand was the crude D'zertano nut and bolt, and when he tried it it moved in the same manner. But the engine bolt did not work that way—it had to be turned clockwise to *remove* it.

Dropping the nut and bolt he placed the wrench on the massive engine bolt and slowly applied pressure in what felt like the completely wrong direction, as if he were tightening not loosening. It gave slowly, first a quarter then a half turn. And bit by bit the projection threads vanished until they were level with the surface of the nut. It turned easily now and within a minute it fell into the pit—he threw the wrench after it and scrambled out. Standing at the edge he carefully sniffed the air, ready to run at the slightest smell of gas. There was nothing.

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The second nut came off as easily as the first and with no ill effects. Jason pushed a sharp chisel between the upper case and the baseplate where he had removed the solder, and when he leaned on it the case shifted slightly, held down only by its own weight.

From the entrance to the enclosure he shouted to the group huddled in the distance. "Come on back—this job is almost finished."

They all took turns at sliding into the pit and looking at the projecting bolts and made appreciative sounds when Jason leaned on the chisel and showed how the case was free.

"There is still the little matter of taking it off," he told them, "and I'm sure that grabbing and heaving is the wrong way. That was my first idea too, but the people who assembled that thing had some bad trouble in store for anyone who tightened those nuts instead of loosening them. Until we find out what that is we are going to tread very lightly. Do you have any big blocks of ice around here, Edipon? It is winter now, isn't it?"

"Ice? Winter?" Edipon mumbled, caught off guard by the change of direction, rubbing abstractedly at the reddened tip of his prominent nose. "Of course it is winter. Ice, there must be ice at the higher lakes in the mountain, they are always frozen at this time of the year. But what do you want ice for?"

"You get it and I'll show you. Have it cut in nice flat blocks that I can stack. I'm not going to lift off the hood —I'm going to drop the engine out from underneath it!"

By the time the slaves had brought the ice down from the distant lakes Jason had rigged a strong wooden frame flat on the ground around the engine and pushed sharpened metal wedges under the hood, then had secured the wedges to the frame. Now, if the engine was lowered into the pit, the hood would stay above supported by the wedges. The ice would take care of this. Jason built a foundation of ice under the engine then slipped out the supporting bars. Now as the ice slowly melted the engine would be gently lowered into the pit.

The weather remained cold and the ice refused to melt until Jason had the pit ringed with smoking oil stoves. Water began to run down into the pit and Mikah went to work bailing it out, while the gap between the hood and the baseplate widened. The melting continued for the rest of the day and almost all of the night. Red-eyed and exhausted Jason and Mikah supervised the soggy sinking and when the D'zertanoj returned at dawn the engine rested safely in a pool of mud on the bottom of the pit; the hood was off.

"They're tricky devils over there in Appsala, but Jason dinAlt wasn't born yesterday," he exulted. "Do you see that crock sitting there on top of the engine," he pointed to a sealed container of thick glass the size of a small barrel, filled with an oily greenish liquid; it was clamped down tightly with padded supports. "That's the booby trap. The nuts I took off were on the threaded ends of two bars that held the hood on, but instead of being fastened directly to the hood they were connected by a crossbar that rested on top of that jug. If either nut was tightened instead of being loosened, the bar would have bent and broken the glass. I'll give you exactly one guess as to what would have happened then."

"The poison liquid!"

"None other. And the double-walled hood is filled with it, too. I suggest that as soon as we have dug a deep hole in the desert the hood and container be buried and forgotten about. I doubt if the engine has many other surprises in store, but I'll be careful as I work on it."

"You can fix it? You know what is wrong with it?" Edipon was vibrating with joy.

"Not yet, I have barely looked at the thing. In fact one look was enough to convince that the job will be as easy as stealing *kreno* from a blind man. The engine is as inefficient and clumsy in construction as your petroleum still. If you people put one tenth of the energy into research and improving your product as you do into hiding it from the competition, you would all be flying jets."

"I forgive your insult because you have done us a service. You will now fix this engine and the other engines. A new day is breaking for us!"

"Right now it is a new night that is breaking for me," Jason yawned. "I have two days sleep to make up. See if you can talk your sons into wiping the water off that engine before it rusts away, and when I get back I'll see what I can do about getting it into running condition."

IX

Edipon's good mood remained and Jason took advantage of it by extracting as many concessions as possible. By hinting that there might be more traps in the engine permission was easily gained to do all the work on the original site instead of inside the sealed and guarded buildings. A covered shed gave them protection from the weather and a test stand was constructed to hold the engines when Jason worked on them. This was of a unique design and built to Jason's exacting specification, and since no one, including Mikah, had ever heard of or seen a test stand before Jason had his way.

The first engine proved to have a burnt-out bearing and Jason rebuilt it by melting down the original bearing metal and casting it in position. When he unbolted the head of the massive single cylinder he shuddered at the clearance around the piston; he could fit his fingers into the opening between the piston and the cylinder wall; by introducing cylinder rings he doubled the compression and power output. When Edipon saw the turn of speed the rebuilt engine gave his *caro* he hugged Jason to his bosom and promised him the highest reward. This turned out to be a small piece of meat every day to relieve the monotony of the *kreno* meals, and a doubled guard to make sure that his valuable property did not escape.

Jason had his own plans and kept busy manufacturing

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a number of pieces of equipment that had nothing at all to do with his engine-overhauling business. While these were being assembled he went about lining up a little aid.

"What would you do if I gave you a club?" he asked a burly slave whom he was helping to haul a log towards his workshop. Narsisi and one of his brothers lazed along out of earshot, bored by the routine of the guard duty.

"What I do with club?" the slave grunted, forehead furrowing and mouth gaping open with the effort of thought.

"That's what I asked. And keep pulling while you think, I don't want the guards to notice anything."

"If I have club, I kill!" the slave announced excitedly, fingers grasping eagerly for coveted weapon.

"Would you kill me?"

"I have club, I kill you, you not so big."

"But if I gave you the club wouldn't I be your friend? Then wouldn't you want to kill someone else?"

The novelty of this alien thought stopped the slave dead and he scratched his head perplexedly until Narsisi lashed him back to work. Jason sighed and found another slave to try his sales program on.

It took a while, but the idea was eventually percolating through the ranks of the slaves. All they had to look forward to from the D'zertanoj was backbreaking labor and an early death. Jason offered them something else, weapons, a chance to kill their masters, and even more killing later when they marched on Appsala. It was difficult for them to grasp the idea that they must work together to accomplish this and not kill Jason and each other as soon as they received weapons.

It was a chancy plan at best, and would probably break down long before any visit could be made to the city. But the revolt should be enough to free them from bondage, even if the slaves fled afterwards. There were less than fifty D'zertanoj at this well station, all men, with their women and children at some other settlement further back in the hills. It would not be too hard to kill them or chase them off and long before they could bring reinforcements Jason and his runaway slaves would be gone. There was just one factor missing from his plans and a new draft of slaves solved even that problem for him.

"Happy days," he laughed, pushing open the door to his quarters and rubbing his hands together with glee. The guard shoved Mikah in after him and locked the door. Jason secured it with his own interior bolt then waved the two others over to the corner farthest from the door and tiny window opening.

"New slaves today," he told them, "and one of them is from Appsala, a mercenary or a soldier of some kind that they captured on a skirmish. He knows that they will never let him live long enough to leave here, so he was grateful for any suggestions I had."

"This is man's talk I do not understand," Ijale said, turning away and starting towards the cooking fire.

"You'll understand this," Jason said, taking her by the shoulder. "The soldier knows where Appsala is and can lead us there. The time has come to think about leaving this place."

He had all of her attention now, and Mikah's as well. "How is this?" she gasped.

"I have been making my plans, I have enough files and lockpicks now to crack into every room in this place, a few weapons, the key to the armory and every able bodied slave on my side."

"What do you plan to do?" Mikah asked.

"Stage a servile revolt in the best style. The slaves fight the D'zertanoj and we get away, perhaps with an army helping us, but at least we get away."

"You are talking *revolution!*" Mikah bellowed and Jason jumped him and knocked him to the floor. Ijale held his legs down while Jason squatted on his chest and covered his mouth.

"What is the matter with you? Want to spend the rest of your life rebuilding stolen engines? They are guarding us too well for there to be much chance of our breaking out on our own, so we need allies. We have them ready made, all the slaves."

"Brevilushun . . ." Mikah mumbled through the restraining fingers.

"Of course it's a revolution. It is also the only possible chance of survival that these poor devils will ever have. Now they are human cattle, beaten and killed on whim. You can't be feeling sorry for the D'zertanoj—every one of them is a murderer ten times over. You've seen them beat people to death. Do you feel that they are too nice to suffer a revolution?"

Mikah relaxed and Jason removed his hand slightly, ready to clamp down if the other's voice rose above a whisper.

"Of course they are not nice, beasts in human garb is more truthful. I feel no mercy for them and they should be wiped out and blotted from the face of the earth as was Sodom and Gomorrah. But it cannot be done by revolution, revolution is evil, inherently evil."

Jason stifled a groan. "Try telling that to two-thirds of the governments that now exist, since that's about how many were founded by revolution. Nice, liberal democratic governments—that were started by a bunch of lads with guns and the immense desire to run things in a manner more beneficial to themselves. How else do you get rid of the powers on your neck if there is no way to legally vote them away? If you can't vote them—shoot them."

"Bloody revolution, it cannot be!"

"All right, no revolution," Jason said, getting up and wiping his hands disgustedly. "We'll change the name. How about calling it a prison break? No, you wouldn't like that either. I have it—liberation! We are going to strike the chains off these poor people and restore them to the lands from which they were stolen. The tiny fact that the slave holders regard them as property and won't think much of the idea, therefore might get hurt in the

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process, shouldn't bother you. So—will you join me in this Liberation Movement?"

"It is still revolution."

"It is whatever I decide to call it!" Jason raged. "You come along with me on the plans or you will be left behind when we go. You have my word on that." He stomped over and helped himself to some soup and waited for his anger to simmer down.

"I cannot do it . . . I cannot do it," Mikah brooded, staring into his rapidly cooling soup as into an oracular crystal ball, seeking guidance there. Jason turned his back in disgust.

"Don't end up like him," he warned Ijale, pointing his spoon back over his shoulder. "Not that there is much chance that you ever will coming as you do from a society with its feet firmly planted on the ground, or on the grave to be more accurate. Your people see only concrete facts, and only the most obvious ones, and as simple an abstraction as 'trust' seems beyond you. While this long-faced clown can only think in abstractions of abstractions, and the more un-real they are the better. I bet he even worries about how many angels can dance on the head of a pin."

"I do not worry about it," Mikah broke in, overhearing the remark. "But I do think about it once in a while, it is a problem that cannot be lightly dismissed."

"You see?"

Ijale nodded. "If he is wrong, and I am wrong—then you must be the only one who is right." She nodded in satisfaction at the thought.

"Very nice of you to say so," Jason smiled. "And true, too. I lay no claims to infallibility but I am sure that I can see the difference between abstractions and facts a lot better than either of you, and I am certainly more adroit at handling them. The Jason dinAlt fan club meeting is now adjourned." He reached his hand over his shoulder and patted himself on the back.

"Monster of arrogance," Mikah bellowed.

"Oh, shut up."

"Pride goeth before a fall! You are a maledicent and idolatrous antipietist . . ."

"Very good."

". . . And I grieve that I could have considered aiding you for even a second, or of standing by while you sin, and fear for the weakness of my own soul that I have not been able to resist temptation as I should. It grieves me, but I must do my duty." He banged loudly on the door, "Guard! Guard!"

Jason dropped his bowl and started to scramble to his feet, but slipped in the spilled soup and fell. As he stood again the locks rattled on the door and it opened. If he could reach Mikah before the idiot opened his mouth he would close it forever, or at least knock him out before it was too late.

It was too late. Narsisi poked his head in and blinked sleepily; Mikah struck his most dramatic pose and pointed to Jason. "Seize and arrest that man, I denounce him for attempted revolution, for planning red murder!"

Jason skidded to a halt and back-tracked, diving into a bag of his personal belongings that lay against the wall. He scrabbled in it, then kicked the contents about and finally came up with a metal-forming hammer that had a weighty solid lead head.

"More traitor you," Jason shouted at Mikah as he ran at Narsisi who had been dumbly watching the performance and mulling over Mikah's words. Slow as he appeared, there was nothing wrong with his reflexes and his shield snapped up and took Jason's blow while his club spun over neatly and rapped Jason on the back of the hand: the numbed fingers opened and the hammer dropped to the floor.

"I think you two better come with me, my father will know what to do," he said, pushing Jason and Mikah ahead of him out of the door. He locked it and called for one of his brothers to stand guard, then poked his captives down the hall. They shuffled along in their leg-irons, Mikah nobly as a martyr and Jason seething and grinding his teeth.

Edipon was not at all stupid when it came to slave rebellions, and sized up the situation even faster than Narsisi could relate it.

"I have been expecting this, so it comes as no surprise." His eyes held a mean little glitter when he leveled them at Jason. "I knew the time would come when you would try to overthrow me, which was why I permitted this other to assist you and to learn your skills. As I expected he has betrayed you to gain your position, which I award him now."

"Betray? I did this for no personal gain," Mikah protested.

"Only the purest of motives." Jason laughed coldly. "Don't believe a word this pious crook tells you, Edipon. I'm not planning any revolutions, he just said that to get my job."

"You caluminate me, Jason! I never lie—you are planning revolt. You told me—"

"Silence both of you, or I'll have you beaten to death. This is my judgment. The slave Mikah has betrayed the slave Jason, and whether the slave Jason is planning rebellion or not is completely unimportant. His assistant would have not denounced him unless he was sure that he could do the work as well, which is the only fact that has any importance to me. Your ideas about a worker-class have troubled me Jason, I will be glad to kill them and you at the same time. Chain him with the slaves. Mikah, I award you Jason's quarter and woman, and as long as you do the work well I will not kill you. Do it a long time and you live a long time.

"Only the purest of motives, is that what you said, Mikah?" Jason shouted back as he was kicked from the room.

The descent from the pinnacle of power was fast and

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smooth. Within half an hour new shackles were on Jason's wrists and he was chained to the wall in a dark room filled with other slaves. His leg-irons had been left on as an additional reminder of his new status. He rattled the chains and examined them in the dim light of a distant lamp as soon as the door was closed.

"How comes the revolution?" the slave chained next to him leaned over and asked in a hoarse whisper.

"Very funny, ha-ha," Jason grumbled, then moved closer for a better look at the man who had a fine case of strabismus, his eyes pointing in independent directions. "You look familiar . . . are you the new slave I talked to today?"

"That's me, Snarbi, fine soldier, pikeman, checked out on club and dagger, seven kills and two possibles on my record, you can check it yourself at the guild hall."

"I remember it all Snarbi, including the fact that you know your way back to Appsala."

"I've been around."

"Then the revolution is still on, in fact it is starting right now but I want to keep it small. Instead of freeing all these slaves what do you say to the idea that we two escape by ourselves?"

"Best idea I heard since torture was invented, we don't need all these stupid people. They just get in the way. Keep the operation small and fast, that's what I always say.'

"I always say that, too," Jason agreed, digging into his boot with his fingertip. He had managed to shove his best file and a lockpick into hiding there while Mikah was betraying him back in their room. The attack on Narsisi with the hammer had just been a cover up.

Jason had made the file himself after many attempts at manufacturing and hardening steel, and the experiments had been successful. He picked out the clay that covered the cut he had made in his leg-cuffs and tackled the soft iron with vigor; within three minutes they were lying on the floor.

"You a magician?" Snarbi whispered, shuddering back.

"Mechanic. On this planet they're the same thing." He looked around but the exhausted slaves were all asleep and had heard nothing. Wrapping a piece of leather around it to muffle the sound he began to file a link in the chain that secured the shackles on his wrists. "Snarbi," he asked, "are we on the same chain?"

"Yeah, the chain goes through these iron cuff things and holds the whole row of slaves together, the other end goes out through a hole in the wall."

"Couldn't be better. I'm filing one of these links, and when it goes we're both free. See if you can't slip the chain through the holes in your shackles and lay it down without letting the next slave know what is happening. We'll wear these iron cuffs for now, there is no time to play around with them and they shouldn't bother us too much. Do the guards come through here at all during the night to check on the slaves?"

"Not since I've been here, just wake us up in the morning by pulling on the chain."

"Then let's hope that's what happens again tonight, because we are going to need plenty of time—*there!*" The file had cut through the link. "See if you can get enough of a grip on the other end of this link while I hold this end, we'll try and bend it open a bit." They strained silently until the opening gaped wide and the next link fitted through the cut.

They slipped the chain and laid it silently on the ground, then drifted noiselessly to the door.

"Is there a guard outside?" Jason asked.

"Not that I know, I don't think they have enough men here to guard all the slaves."

The door would not budge when they pushed against it, and there was just light enough to make out the large keyhole of a massive inset lock. Jason probed lightly with the pick and curled his lip in contempt.

"These idiots have left the key in the lock." He pulled off the stiffest of his leather wrappings and after flattening it out pushed it under the badly fitting bottom edge of the door, leaving just a bit to hold onto. Then he poked lightly at the key through the keyhole and heard it thud to the ground outside. When he pulled the leather back in the key was lying in the center of it. The door unlocked silently and a moment later they were outside, staring tensely into the darkness.

"Let's go! Run, get away from here," Snarbi said and Jason grabbed him by the throat and pulled him back.

"Isn't there one drop of constructive intelligence on this planet? How are you going to get to Appsala without food or water, and if you find some—how can you carry enough? You want to stay alive follow my instructions. I'm going to lock this door first so that no one stumbles onto our escape by accident. Then we are going to get some transport and leave here in style. Agreed?"

The answer was only a choked rattle until Jason opened his fingers a bit and let some air into the man's lungs. A labored groan must have meant assent because Snarbi tottered after him when he made his way through the dark alleys between the buildings.

Getting clear of the walled refinery town presented no problem since the few sentries were only looking for trouble from the outside. It was equally easy to approach Jason's leather-walled worksite from the rear and slip through it at the spot where Jason had cut the leather and sewn up the opening with thin twine.

"Sit here and touch nothing or you will be cursed for life," he commanded the shivering Snarbi, then slipped towards the front entrance with a small sledge hammer clutched in his fist. He was pleased to see one of Edipon's other sons on guard duty, leaning against a pole and dozing. Jason gently lifted his leather helm with his free hand and tapped once with the hammer: the guard slept even more soundly.

"Now we can get to work," Jason said when he had

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returned inside, and clicked a firelighter to the wick of a lantern.

"What are you doing? They'll see us, kill us—escaped slaves."

"Stick with me Snarbi and you'll be wearing shoes. Lights here can't be seen by the sentries, I made sure of that when I sited the place. And we have a piece of work to do before we leave—we have to build a *caro*."

They did not have to build it from scratch, but there was enough truth in the statement to justify it. His most recently rebuilt and most powerful engine was still bolted to the test stand, a fact that justified all the night's risks. Three *caro* wheels lay among the other debris of the camp and two of them were to be bolted to the engine while it was still on the stand. The ends of the driving axle cleared the edges of the stand, Jason threaded the securing wheel bolts into place and utilized Snarbi to tighten them.

At the other end of the stand was a strong, swiveling post that had been a support for his test instruments, and seemed strangely large for this small task. It was. When the instruments were stripped away a single bar remained projecting backwards like a tiller handle. When a third wheel was fitted with a stub axle and slid into place in the forked lower end of the post the test stand looked remarkably like a three-wheeled, steerable, steam engine powered platform that was mounted on legs. This is exactly what it was, what Jason had designed it to be from the first, and the supporting legs came away with the same ease that the other parts had been attached. Escape had always taken first priority in his plans.

Snarbi dragged over the crockery jars of oil, water and fuel while Jason filled the tanks. He started the fire under the boiler and loaded aboard tools and the small supply of *kreno* he had managed to set aside from their rations. All of this took time, but not time enough. It would soon be dawn and they would have to leave before then, and he could no longer avoid making up his mind. He could not leave Ijale here, and if he went to get her he could not refuse to take Mikah as well. The man had saved his life, no matter what murderous idiocies he had managed to pull since that time. Jason believed that you owed something to a man who prolonged your existence, but he also wondered just how much he still owed. In Mikah's case he felt the balance of the debt to be mighty small, if not overdrawn. Perhaps this one last time.

"Keep an eye on the engine and I'll be back as soon as I can," he said, jumping to the ground and loading on equipment.

"You want me to do *what?* Stay here with this devil machine? I cannot! It will burn and consume me—"

"Act your age, Snarbi, your physical age if not your mental one. This rolling junk pile was made by men and repaired and improved by me, no demons involved. It burns oil to make heat that makes steam that goes to this tube to push that rod to make those wheels go around so we can move, and that is as much of the theory of the steam engine as you are going to get from me. Maybe you can understand this better—only I can get you safely away from here. Therefore, you will stay and do as I say or I will beat your brains in. Clear?"

Snarbi nodded dumbly.

"Fine. All you have to do is sit here and look at this little green disk, see it? If it should pop out before I come back turn *this* handle in *this* direction. Clear enough? That way the safety valve won't blow and wake the whole country and we'll still have a head of steam."

Jason went out past the still-silent sentry and headed back towards the refinery station. Instead of a club or a dagger he was armed with a well tempered broadsword that he had managed to manufacture under the noses of the guards. They had examined everything he brought from the worksite, since he had been working in the evenings in his room, but ignored everything he manufactured as being beyond their comprehension. This

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primordial mental attitude had been of immense value for in addition to the sword he carried a sack of molotails, a simple weapon of assault whose origins were lost in prehistory. Small crocks were filled with the most combustible of the refinery's fractions and wrapped around outside with cloth that he had soaked in the same liquid. The stench made him dizzy and he hoped that they would repay his efforts when the time came, since they were completely untried. In use one lit the outer covering and threw them. The crockery burst on impact and the fuse ignited the contents. Theoretically.

Getting back in proved to be as easy as getting out, and Jason felt an unmistakable twinge of regret. His subconscious had obviously been hoping that there would be a disturbance and he would have to retreat to save himself, his subconscious obviously being very short on interest in saving the slave girl and his nemesis, particularly at the risk of his own skin. His subconscious was disappointed. He was in the building where his quarters lay, trying to peek around the corner to see if a guard was at the door. There was, and he seemed to be dozing, but something jerked him awake. He had heard nothing but he sniffed the air and wrinkled his nose; the powerful smell of water-of-power from Jason's molotails had roused him and he spotted Jason before he could pull back.

"Who is there?" he shouted and advanced at a lumbering run.

There was no quiet way out of this one so Jason leaped out with an echoing shout and lunged. The blade went right under the man's guard—he must never have seen a sword before—and the tip caught him full in the throat. He expired with a bubbling wail that stirred voices deeper in the building. Jason sprang over the corpse and tore at the multifold bolts and locks that sealed the door. Footsteps were running in the distance when he finally threw the door open and ran in.

"Get out and quick we're escaping!" he shouted at them and pushed the dazed Ijale towards the door and exacted a great deal of pleasure from landing a tremendous kick that literally lifted Mikah through the opening, where he collided with Edipon who had just run up waving a club. Jason leaped over the tumbled forms, rapped Edipon behind the ear with the hilt of his sword and dragged Mikah to his feet.

"Get out to the engine works," he ordered his still uncomprehending companions. "I have a *caro* there that we can get away in." He cursed them and they finally broke into clumsy motion. There were shouts from behind him and an armed mob of D'zertanoj ran into view. Jason pulled down the hall light, burning his hand on the hot base at the same time, and applied its open flame to one of his molotails. The wick caught with a roar of flame and he threw it at approaching soldiers before it could burn his hand. It flew towards them, hit the wall and broke, inflammable fuel spurted in every direction and the flame went out.

Jason cursed and grappled for another molotail, because if they didn't work he was dead. The D'zertanoj had hesitated a moment rather than walk through the puddle of spilled water-of-power and in that instant he hurled the second fire bomb. This one burst nicely too, and lived up to its maker's expectations when it ignited the first molotail as well and the passageway filled with a curtain of fire. Holding his hand around the lamp flame so it wouldn't go out, Jason ran after the others.

So far the alarm had not spread outside of the building and Jason bolted the door from the outside. By the time this was broken open and the confusion sorted out they would be clear of the buildings. There was no need for the lamp now and would only give him away. He blew it out and from the desert came a continuous and ear-piercing scream.

"He's done it," Jason groaned. "That's the safety valve on the steam engine!"

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He bumped into Ijale and Mikah who were milling about confusedly in the dark, kicked Mikah again out of sheer malice and hatred of all mankind, and led them towards the worksite at a dead run.

They escaped unharmed mainly because of the confusion on all sides of them. The D'zertanoj seemed to never have experienced a night attack before, which they apparently thought this was, and did an incredible amount of rushing about and shouting. Matters were not helped by the burning building nor the unconscious form of Edipon that was carried from the blaze. All the D'zertanoj had been roused by the scream of the safety valve, that was still bleeding irreplacable steam into the night air, and there was much milling about.

In the confusion the fleeing slaves were not noticed, and Jason led them around the guard post on the walls and directly towards the worksite. They were spotted as they crossed the empty ground and after some hesitation the guard ran in pursuit. Jason was leading the enemy directly to his precious steam-wagon, but he had no choice. The thing was certainly making its presence known in any case, and unless he reached it at once the head of steam would be gone and they would be trapped. He leaped the still recumbent guard at the entrance and ran towards his machine. Snarbi was cowering behind one wheel but there was no time to give him any attention. As Jason jumped onto the platform the safety valve closed and the sudden stillness was frightening. The steam was gone.

With frantic grabs he spun valves and shot one glance at the indicator: there wasn't enough steam left to roll the meters. Water gurgled and the boiler hissed and clacked at him while screams of anger came from the D'zertanoj as they ran into the enclosure and saw the bootleg *caro*. Jason thrust the end of a molotail into the firebox; it caught fire and he turned and hurled it at them. The angry cries turned into screams of fear as the tongues of flame licked up at the pursuers and they retreated in disorder. Jason ran after them and hastened their departure with another molotail. They seemed to be retreating as far as the refinery walls, but he could not be sure in the darkness if some of them weren't creeping around to the sides.

He hurried back to the *caro*, tapped on the still-unmoving pressure indicator and opened the fuel feed wide. As an afterthought he wired down the safety valve since his reinforced boiler should hold more pressure than the valve had been originally adjusted for. Once this was finished he chewed at his oily fingernails since there was nothing else that could be done until the pressure built up again. The D'zertanoj would rally, someone would take charge, and they would attack the worksite. If they had enough steam before this happened, they would escape. If not—

"Mikah, and you, too, you cowering slob Snarbi you, get behind this thing and push," Jason said.

"What has happened," Mikah asked. "Have you started this revolution? If so I will give no aid . . ."

"We're escaping, if that's all right with you. Just I, Ijale and a guide to show us the way. You don't have to come—"

"I will join you. There is nothing criminal in escaping from these barbarians."

"Very nice of you to say so. Now push. I want this steamobile in the center, far from all the walls, and pointing towards the desert. Down the valley I guess, is that right, Snarbi?"

"Down the valley, sure, that's the way." His voice was still rasping from the earlier throttling, Jason was pleased to notice.

"Stop it here and everyone aboard. Grab onto those bars I've bolted along the sides so you won't get bounced off, if we ever start moving that is."

Jason took a quick look through his workshop to make sure everything they might need was already loaded, then reluctantly climbed aboard himself. He blew out the lantern and they sat there in the darkness, their faces lit from below by the flickering glow from the firebox, while the tension mounted. There was no way to measure time since each second took an eternity to drag by.

The walls of the worksite cut off any view of the outside and within a few moments imagination had peopled the night with silent hordes creeping towards them, huddling about the thin barrier of leather, ready to swoop down and crush them in an instant.

"Let's run for it," Snarbi gurgled and tried to jump from the platform. "We're trapped here, we'll never get away . . ."

Jason tripped him and knocked him flat, then pounded his head against the floor planks a few times until he quieted.

"I can sympathize with that poor man," Mikah said severely, "You are a brute, Jason, to punish him for his natural feelings. Cease your sadistic attack and join me in a prayer."

"If this poor man you are so sorry for had simply done his duty and watched the boiler, we would all be safely away from here by now. And if you have enough breath for a prayer, put it to better use by blowing into the firebox. It's not going to be wishes or prayers that gets us out of here, just a head of steam."

A howled battlecry was echoed by massed voices and a squad of D'zertanoj burst in through the entrance, and at the same instant the rear of the leather wall went down and more armed men swarmed over it. The immoble *caro* was trapped between the two groups of attackers who laughed happily as they charged. Jason cursed and lit four molotails at the same time and hurled them two and two in opposite directions. Before they hit he had jumped to the steam valve and wound it open; with a hissing clank the *caro* shuddered and got underway.

For the moment the attackers were held back by the

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walls of flame and screamed even louder as the machine moved away at right angles from between their two groups. The air whistled with crossbow bolts, but most were badly aimed and only a few thudded into the baggage. With each revolution of the wheels their speed picked up and when they hit the walls the hides parted with a creaking snap. Strips of leather whipped at them, then they were through.

The shouts and the fires grew dimmer behind them as they streaked down the valley at a suicidal pace, hissing, rattling and crashing over the bumps. Jason clung to the tiller and shouted for Mikah to come relieve him, since if he let go of the thing they would turn and crash in an instant, and as long as he held it he couldn't cut down the steam. Some of this finally penetrated to Mikah because he crawled forward grasping desperately to every handhold until he crouched beside Jason.

"Grab this tiller and hold it straight and steer around anything big enough to see."

As soon as the steering was taken over Jason worked his way back to the engine and throttled down; they slowed to a clanking walk then stopped completely. Ijale moaned and Jason felt as if every inch of his body had been beaten with hammers. There was no sign of pursuit since it would be at least an hour before they could raise steam in the *caroj* and no one on foot could have possibly matched their headlong pace. The lantern he had used earlier had vanished during the wild ride so Jason dug out another one of his own construction.

"On your feet, Snarbi," he ordered. "I've cracked us all out of slavery so now it is time for you to do some of the guiding that you were telling me about. Walk ahead with this light and pick out a nice smooth track going in the right direction. I never did have a chance to build headlights for this machine so you will have to do instead."

Snarbi climbed down unsteadily and walked out in front. Jason opened the valve a bit and they clattered forward on his trail as Mikah turned the tiller to follow. Ijale crawled over and settled herself against Jason's side, shivering with cold and fright. He patted her shoulder.

"Relax," he said, "from now on this is just a pleasure trip."

X

They were six days out of Putl'ko and their supplies were almost exhausted. The country, once they were away from the mountains, became more fertile, an undulating pampas of grass with enough streams and herds of beasts to assure that they did not starve. It was fuel that mattered, and that afternoon Jason had opened their last jar. They stopped a few hours before dark since their fresh meat was gone, and Snarbi took the crossbow and went out to shoot something for the pot. Since he was the only one who could handle the clumsy weapon with any kind of skill in spite of his ocular deficiencies, and who knew about the local game, this task had been assigned to him. With longer contact his fear of the *caro* had lessened, and his self-esteem rose at his recognized ability as a hunter. He strolled arrogantly out into the knee-high grass, crossbow over his shoulder, whistling tunelessly through his teeth. Jason stared after him and once again felt a growing unease.

"I don't trust that wall-eyed mercenary, I don't trust him for one second," he muttered.

"Were you talking to me?" Mikah asked.

"I wasn't but I might as well now. Have you noticed anything interesting about the country we have been passing through, anything different?"

"Nothing. It is a wilderness, untouched by the hand of man."

"Then you must be blind, because I have been seeing things the last two days, and I know just as little about woodcraft as you do. Ijale," he called, and she looked up from the boiler over which she was heating a thin stew of their last *kreno*. "Leave that stuff, it tastes just as bad whatever is done to it, and if Snarbi has any luck we'll be having roast in any case. Tell me, have you seen anything strange or different about the land we passed through today."

"Nothing strange, just signs of people. Twice we passed places where the grass was flat and branches broken as if a *caro* passed two or three days ago, maybe more. And once there was a place where someone had built a cooking fire, but that was very old."

"Nothing to be seen, Mikah?" Jason asked with raised eyebrows. "See what a lifetime of *kreno* hunting can do for the sense of observation and terrain."

"I am no savage. You cannot expect me to look out for that sort of thing."

"I don't. I have learned to expect very little from you beside trouble. Only now I am going to need your help. This is Snarbi's last night of freedom whether he knows it or not, and I don't want him standing guard tonight, so you and I will split the shift."

Mikah was astonished. "I do not understand. What do you mean this is his last night of freedom?"

"It should be obvious by now—even to you—after seeing how the social ethic works on this planet. What did you think we were going to do when we came to Appsala—follow Snarki like sheep to the slaughter? I have no idea what he is planning, I just know he must be planning something. When I ask him about the city he only answers in generalities. Of course he is a hired mercenary who wouldn't know too much of the details, but he must know a lot more than he is telling us. He says we are still four days away from the city. My guess is that we are no more than one or two. In the morning I intend to grab him and tie him up, then swing over to those hills there and find a place to hole up. I'll fix some chains for Snarbi so he can't get away, then I'll do a scout of the city . . ."

"You are going to chain this poor man, make a slave of him for no reason!"

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"I'm not going to make a slave of him, just chain him to make sure he doesn't lead us into some trap that will benefit him. This souped-up *caro* is valuable enough to tempt any of the locals, and if he can sell me as an engine-mechanic slave his fortune is made."

"I will not hear this!" Mikah stormed. "You condemn the man on no evidence at all, just because of your nasty minded suspicions. Judge not lest ye be judged yourself! And you play the hypocrite as well, because I well remember your telling me that a man is innocent until proven guilty."

"Well this man is guilty, if you want to put it that way, guilty of being a member of this broken down society, which means that he will always act in certain ways at certain times. Haven't you learned anything about these people yet? Ijale!" She looked up from contented munching on a *kreno*, obviously not listening to the argument. "Tell me, what is your opinion? We are coming soon to a place where Snarbi has friends, or people who will help him. What do you think he will do?"

"Say hello to the people he knows? Maybe they will give him a *kreno*." She smiled in satisfaction at her answer and took another bite.

"That's not quite what I had in mind," Jason said patiently. "What if we three are with him when we come to the people, and the people see us and the *caro* . . . "

She sat up, alarmed. "We can't go with him! If he has people there they will fight us, make us slaves, take the *caro*. You must kill Snarbi at once."

"Bloodthirsty heathen . . ." Mikah began in his best denunciatory voice, but quit when he saw Jason pick up a heavy hammer.

"Do you understand yet?" Jason asked. "By tying up Snarbi I'm only conforming to a local code of ethic, like saluting in the army or not eating with your fingers in polite society. In fact I'm being a little slipshod, since by local custom I should kill him before he can make us trouble."

"It cannot be, I cannot believe it. You cannot judge and condemn a man upon such flimsy evidence."

"I'm not condemning him," Jason said with growing irritation, "Just making sure that he can't cause me any trouble. You don't have to agree with me to help me, just don't get in my way. And split the guard with me tonight. Whatever I do in the morning will be on my shoulders and no concern of yours."

"He is returning," Ijale hissed, and a moment later Snarbi came up through the high grass.

"Got a *cervo*," he announced proudly, and dropped the animal down before them. "Cut him up, makes good chops and roast. We eat tonight."

He was completely innocent and without guile and the only thing guilty about him was his shifty gaze which could be blamed completely on his crossed eyes. Jason wondered for a second if his assessment of the danger was correct, then remembered where he was and lost his doubts. Snarbi would be committing no crime if he tried to kill or enslave them, just doing what any ordinary, decent slave-holding barbarian would do in his place. Jason searched through his tool box for some rivets that could be used to fasten the leg irons on the man.

They had a filling dinner and the others turned in at dusk and were quickly asleep. Jason, tired from the labors of the trip and heavy with food, forced himself to remain awake, trying to keep alert for trouble both from within and from without. When he became too sleepy he paced around the camp until the cold drove him back to the shelter of the still-warm boiler. Above him the stars wheeled slowly and when a prominent one reached the zenith he estimated it was midnight, or a bit after. He shook Mikah awake.

"You're on now. Keep your eyes and ears open for anything stirring and don't forget a careful watch there," he jerked his thumb at Snarbi's silent form. "Wake me up at once if there is anything suspicious."

Sleep dropped like a heavy curtain and Jason barely stirred until the first light of dawn touched the sky. Only the brighter stars were visible on the eastern horizon and he could see a ground fog rising from the grass around them. Near him were the huddled forms of the two sleepers and the farthest one shifted in his sleep and he realized it was Mikah.

Sleep fell away instantly and he bounded out of his skin covers and grabbed the other man by the shoulders. "What are you doing asleep?" he raged. "You were supposed to be on guard."

Mikah opened his eyes and blinked. "I was on guard, but towards morning Snarbi awoke and offered to take his turn. I could not refuse him . . ."

"You couldn't WHAT? After what I said—"

"That was why. I could not judge an innocent man guilty and be a party to your unfair action. Therefore, I left him on guard."

"You did, did you?" Jason grated with rage and pulled an unfelt handful of hair from his newgrown beard. "Then where is he? Do you see anyone on guard?"

Mikah looked in a careful circle and saw only the two of them and the wakening Ijale. "He seems to have gone He has proven his untrustworthiness and in the future we will not allow him to stand guard."

Jason raged, drew his foot back for a kick in the local reflex then realized he had no time for such indulgences and dived for the steamobile. The firelighter worked at the first shot, for a rare change, and he lit the boiler. It roared merrily but when he tapped the indicator he saw the fuel was almost gone. There would be enough left in the last jug to take them to safety before whatever trouble Snarbi was planning arrived. But the jug was gone.

"That tears it," Jason said resignedly after a hectic search of the *caro* and the surrounding plain. The water-of-power had vanished with Snarbi who, afraid as he was of the steam engine, apparently knew enough from ob-

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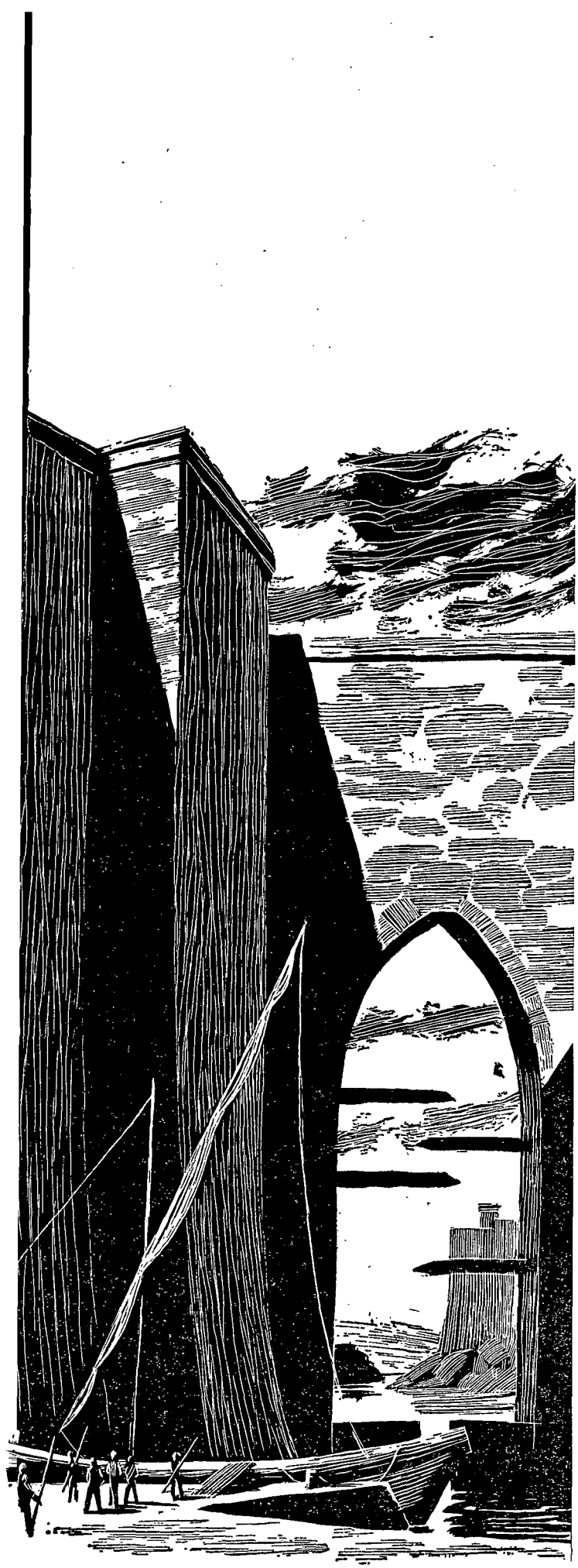

serving Jason fueling the thing that it could not move without the vital liquid. An empty feeling of resignation had replaced Jason's first rage: he should have known better than to trust Mikah with anything, particularly when it involved an ethical point. He stared at the man, now calmly eating a bit of cold roast and marveled at the unruffled calm. "This doesn't bother you, the fact that you have condemned us all to slavery again?"

"I did what was right, I had no other choice. We must live as moral creatures or sink to the level of the animals."

"But when you live with people who behave like animals —how do you survive?

"You live as they do—as you do, Jason," he said with majestic judgment, "twisting and turning with fear and unable to avoid your fate no matter how you squirm. Or you live as I have done, as a man of conviction, knowing what is right and not letting your head be turned by the petty needs of the day. And if one lives this way one can die happy."

"Then die happy!" Jason snarled and reached for his sword, but settled back again glumly before he picked it up. "To think that I ever thought I could teach you anything about the reality of existence here when you have never experienced reality before nor ever will until the day you die. You carry your own attitudes, which are your reality, around with you all the time, and they are more solid to you than this ground we are sitting upon."

"For once we are in agreement, Jason. I have tried to open your eyes to the true light, but you turn away and will not see. You ignore the Eternal Law for the exigencies of the moment and are, therefore, damned."

The pressure indicator on the boiler hissed and popped out, but the fuel level was at the absolute bottom.

"Grab some food for breakfast, Ijale," Jason said, "and get away from this machine. The fuel is gone and it's finished."

"I shall make a bundle to carry, we will escape on foot."

"No, that's out of the question. Snarbi knows this country and he knew we would find out that he was missing at dawn. Whatever kind of trouble he is bringing is already on the way and we wouldn't be able to escape on foot. So we might as well save our energy. But they aren't getting my handmade, super-charged steamobile!" he added with sudden vehemence, grabbing up the crossbow. "Back both of you, far back. They'll make a slave of me for my talents, but no free samples go with it. If they want one of these hot-rod steam wagons, they are going to have to pay for it!"

Jason lay down flat at the maximum range of the crossbow and his third quarrel hit the boiler. It went up with a most satisfactory bang and small pieces of metal and wood rained down all around. In the distance he heard shouting and the barking of dogs.

When he stood he could see a distant line of men advancing through the tall grass and when they were closer large dogs were also visible, tugging at their

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leashes. Though they must have come far in a few hours they approached at a steady trot, experienced runners, in thin leather garments each carrying a short, laminated bow and a full quiver of arrows. They swooped up in a semicircle, their great hounds slavering to be loosed, and stopped when the three strangers were within bow range. They notched their arrows and waited with alert patience, staying well clear of the smoking ruins of the *caro,* until Snarbi finally staggered up half supported by two other runners.

"You now belong to . . . the Hertug Persson . . . and are his slaves . . . What happened to the *caro?*" He screamed this last when he spotted the smoking wreck and would have collapsed except for the sustaining arms. Evidently the new slaves decreased in value with the loss of the machine. He stumbled over to it and, when none of the soldiers would help him, gathered up what he could find of Jason's artifacts and tools. When he had bundled them up, and the foot cavalry had seen that he suffered no injury from the contact, they reluctantly agreed to carry them. One of the soldiers, identical in dress with the others, seemed to be in charge, and when he signaled a return they closed in on the three prisoners and nudged them to their feet with drawn bows.

"I'm coming, I'm coming," Jason said, gnawing on a bone, "but I'm going to finish my breakfast first. I see an endless vista of *krenoj* stretching out before me and intend to enjoy this last meal before entering servitude."

The lead soldiers looked confused and turned to their officer for orders. "Who is this?" he asked Snarbi, pointing at the still seated Jason. "Is there any reason why I should not kill him."

"You can't!" Snarbi choked, and turned a dirty shade of white. "He is the one who built the devil-wagon and knows all of its secrets. Hertug Persson will torture him to build another."

Jason wiped his fingers on the grass and reluctantly stood. "All right gentlemen, let's go. And on the way perhaps someone can tell me just who Hertug Persson is and what is going to happen next."

"I'll tell you," Snarbi bragged as they started the march, "He is Hertug of the Perssonoj. I have fought for the Perssonoj and they knew me and I saw the Hertug himself and he believed me. The Perssonoj are very powerful in Appsala and have many powerful secrets, but not as powerful as the Trozelligoj who have the secret of the *caroj* and the *jetilo*. I knew I could ask any price of the Perssonoj if I brought them the secret of the *caroj*. And I will." He thrust his face close to Jason's with a fierce grimace. "You will tell them the secret. I will help them torture you until you tell."

Jason put out his toe as they walked and Snarbi tripped over it and when the traitor fell he walked the length of his body. None of the soldiers paid any attention to this exchange and when they had passed Snarbi staggered to his feet and tottered after them shouting curses. Jason did not hear them, he had troubles enough as it was.

XI

Seen from the surrounding hills, Appsala looked like a burning city that was being slowly washed into the sea. Only when they had come closer was it clear that the smoke was from the multifold chimneys, both large and small, that studded the buildings, and that the city began at the shore and covered a number of islands in what must be a shallow lagoon. Large sea-going ships were tied up at the seaward side of the city and closer to the mainland smaller craft were being poled through the canals. Jason searched anxiously for a spaceport or any signs of interstellar culture but saw nothing. Then the hills intervened as the trail cut off to one side and approached the sea some distance from the city.

A fair-sized sailing vessel was tied up at the end of a stone wharf, obviously awaiting them, and the captives were tied hand and foot and tossed into the hold. Jason managed to wriggle around until he could get his eye to a crack between two badly fitting planks and recited a running travelogue of the cruise, apparently for the edification of his companions, but really for his own benefit since the sound of his own voice always cheered and encouraged him.

"Our voyage is nearing its close and before us opens up the romantic and ancient city of Appsala, famed for its loathsome customs, murderous natives and archaic sanitation facilities, of which the watery channel this ship is now entering seems to be the major cloaca. There are islands on both sides, the smaller ones covered with hovels so decrepit that in comparison the holes in the grounds of the humblest animals appear to be palaces, while the larger islands appear to be forts, each one walled and barbicaned and presenting a warlike face to the world. There couldn't be that many forts in a town this size so I am led to believe that each one is undoubtedly the guarded stronghold of one of the tribes, groups or clans that our friend Judas told us about. Look on these monuments to ultimate selfishness and beware: this is the end product of the system that begins with slaveholders like the former Ch'aka with their tribes of *kreno* crackers, and builds up through familiar hierarchies like the D'zertanoj and reaches its zenith of depravity behind those strong walls. It is still absolute power that rules absolutely, each man out for all that he can get and the only way to climb being over the bodies of others, and all physical discoveries and inventions being treated as private and personal secret to be hidden and used only for personal gain. Never have I seen human greed and selfishness carried to such extremes and I admire Homo sapiens capacity to follow through on an idea, no matter how it hurts."

The ship lost way as it backed its sails and Jason fell from his precarious perch into the stinking bilge. "The descent of man," he muttered and inched his way out.

Piles grated along the sides and with much shouting and cursed orders the ship came to a halt. The hatch above was slid back and the three captives were rushed

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to the deck. The ship was tied up to a dock in a pool of water surrounded by buildings and high walls. Behind them a large sea gate was just swinging shut, through which the ship had entered from the canal. They could see no more because they were pushed into a doorway and through halls and past guards until they ended up in a large central room. It was unfurnished except for the dias at the far end on which stood a large and rusty iron throne. The man on the throne, undoubtedly the Hertug Persson, sported a magnificent white beard and shoulder length hair, his nose was round and red, his eyes blue and watery. He nibbled at a *kreno* impaled delicately on a two-tined iron fork.

"Tell me," the Hertug shouted suddenly, "why you should not be killed at once?"

"We are your slaves, Hertug, we are your slaves," everyone in the room shouted in unison, waving their hands in the air at the same time. Jason missed the first chorus, but came in on the second. Only Mikah did not join in the chant-and-wave, speaking instead in a solitary voice after the pledge of allegiance was completed.

"I am no man's slave."

The commander of the soldiers swung his thick bow in a short arc that terminated on the top of Mikah's head: he dropped stunned to the floor.

"You have a new slave, oh Hertug," the commander said.

"Which is the one who knows the secrets of the *caroj?*" the Hertug asked and Snarbi pointed at Jason.

"Him there, oh mightiness. He can make *caroj* and he can make the monster that burns and moves them, I know because I watched him do it. He also made balls of fire that burned the D'zertanoj and many other things. I brought him to be your slave so that he could make *caroj* for the Perssonoj. "Here are the pieces of the *caro* we traveled in, after it was consumed by its own fire." Snarbi shook the tools and burnt fragments out onto the floor and the Hertug curled his lip at them.

"What proof is this?" he asked, and turned to Jason. "These things mean nothing. How can you prove to me, slave, that you can do the things he says?"

Jason entertained briefly the idea to deny all knowledge of the matter, which would be a neat revenge against Snarbi who would certainly meet a sticky end for causing all this trouble for nothing, but he discarded the thought as fast as it came. Partly for humanitarian reasons, Snarbi could not help being what he was, but mostly because he had no particular desire to be put to the question. He knew nothing about the local torture methods, and he wanted to keep it that way.

"Proof is easy, Hertug of all the Perssonoj, because I know everything about everything. I can build machines that walk, that talk, that run, fly, swim, bark like a dog and roll on their backs."

"You will build a *caro* for me?"

"It could be arranged, if you have the right kind of tools I could use. But I must first know what is the specialty of your clan, if you know what I mean. Like the Trozelligoj make *caroj* and the D'zertanoj pump oil. What do your people do?"

"You cannot know as much as you say if you do not know of the glories of the Perssonoj!"

"I come from a distant land and as you know news travels slowly around these parts."

"Not around the Perssonoj," the Hertug said scornfully and thumped his chest. "We can talk across the width of the country and always know where our enemies are. We can send magic on wires to kill, or magic to make light in a glass ball or magic that will pluck the sword from an enemy's hand and drive terror into his heart."

"It sounds like your gang has the monopoly on electricity, which is good to hear. If you have some heavy forging equipment . . ."

"Stop!" the Hertug ordered. "Leave! Out—everyone except the *sciuloj*. Not the new slave, he stays here," he shouted when the soldiers grabbed Jason.

The room emptied and the handful of men who remained were all a little long in the tooth and each wore a brazen, sun-burst type decoration on his chest. They were undoubtedly adept in the secret electrical arts and they fingered their weapons and grumbled with unconcealed anger at Jason's forbidden knowledge. The Hertug signaled him to continue.

"You used a sacred word. Who told it to you? Speak quickly or you will be killed."

"Didn't I tell you I knew everything? I can build a *caro* and given a little time I can improve on your electrical works, if your technology is on the same level as the rest of this planet."

"Do you know what lies behind the forbidden portal?" the Hertug asked, pointing to a barred, locked and guarded door at the other end of the room. "There is no way you can have seen what is there, but if you can tell me what lies beyond it I will know you are the wizard that you claim you are."

"I have a very strange feeling that I have been over this ground once before," Jason sighed. "All right, here goes. You people here make electricity, maybe chemically, though I doubt if you would get enough power that way, so you must have a generator of some sort. That will be a big magnet, a piece of special iron that can pick up other iron, and you spin it around fast next to some coils of wire and out comes electricity. You pipe this through copper wire to whatever devices you have, and they can't be very many. You say you talk across the country. I'll bet you don't talk at all but send little clicks, dots and dashes . . . I'm right aren't I?" The foot shuffling and rising buzz from the adepts was a sure sign that he was hitting close. "I have an idea for you, I think I'll invent the telephone. Instead of the old clikkety-clack how would you like to *really* talk across the county? Speak into a gadget here and have your voice come out at the far end of the wire?"

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The Hertug's piggy little eyes blinked greedily. "It is said that in the old days this could be done, but we have tried and have failed. Can you do this thing?"

"I can—if we can come to an agreement first. But before I make any promises I have to see your equipment."

This brought the usual groans of complaint about secrecy, but in the end avarice won over taboo and the door to the holy of holies was opened for Jason while two of the *sciuloj,* with bared and ready daggers, stood at his sides. At almost the same instant Jason looked in through the door he heard the sound.

Now the reactions of the human body, while remarkably fast, need certain finite measures of time and have been measured over and over again with a great deal of accuracy. The commands of the brain, speedy as they may be, must be carried by sluggish nerves and put into operation by inert lumps of muscle. Therefore to say that Jason's reactions were instantaneous is to tell a lie, or at least exaggerate. Only to his watchers did his actions appear to take place that fast; they were older, and less alert, and had not had the advantage of Pyrran survival training. So to their point of view the sacred portal was opened and Jason vanished in a flurry of activity. Two lightning blows sent his guardians spinning, and before they had fallen to the floor their supposed captive was through the door and it was slammed in their faces. Before the first dumfounded Persson could jump forward the bolt grated home inside and the door was sealed.

Things were a little more complex than that to Jason. When the door opened he had had a good view of the inside of the room, of a slave cranking the handle on a crude collection of junk that could only have been a generator. Thick wires looped across the room from the thing to a man who stood before some blades of copper pushing at them with a wooden stick, while above his head fat sparks leaped the gap between two brassy spheres. As if to complete this illustration for a bronze-age edition of "First Steps in Electricity" another cable twisted up from the spark gap and vanished out a small window. The entire thing might have been labled "How To Generate A Radio Signal in the Crudest Manner." As Jason reached this conclusion in the smallest fraction of a second, and at almost the very same instant, he heard the sound.

What he heard could have been distant thunder, an earthquake, a volcano or some giant explosion. It rumbled and rolled, muffled by distance, yet still clear. It resembled none of these things to Jason, but made him think only of a high altitude rocket or jet, cleaving through the atmosphere.

It must have been the juxtaposition of these two things, occurring as they did at the same time, the view of a radio transmitter, no matter how crude, and the thought that there might be a civilized craft of some kind up there containing men who would come to his aid if he could only contact them. The idea was an insane one, but even as he realized that fact he was through the door and bolting it behind him. Perhaps he did it because he had been pushed around entirely too much and felt like pushing someone else for a change. In any case it was done, insane or not, and he might as well carry through.

The generator slave looked up, startled, but when Jason glanced at him he lowered his eyes and kept cranking. The man who had been working the transmitter spun about, startled by the slam of the door and the muffled pounding and shouts that followed instantly from the other side. He groped for his dagger when he saw the stranger, but before it was clear of the scabbard Jason was on him and after a few quick Pyrran infighting blows the man lost all interest in what was happening and slid to the floor. Jason straddled his body, picked the stick up, nodded to the slave who began cranking faster, and began to tap out a message.

S-O-S . . . S-O-S . . . he sent first, then as fragments of code came back to him he spelled out J-A-S-O-N D-A-L-T H-R-E. . . . N-E-E-D A-I-D. . . . R-I-C-H . . . R-E-W-A-R-D . . . F-O-R . . . H-E-L-P . . .

He varied this a bit, repeated his name often, and tried other themes appealing for offworld aid. It was a slim chance that he had heard a rocket, and even slimmer chance that they would pick his message out of the static if they happened to be listening. He had no evidence that any offworlders were in contact with this planet, merely hope. He tapped on and the slave ground away industriously. His arm was growing tired by the time the old guard in the other room found something heavy enough to swing and broke the door down. Jason stopped tapping and turned to face the apoplectic Hertug, rubbing his tired wrist.

"Your equipment works fine, though it could use a lot of improvements."

"Kill him . . . Kill!" the Hertug sputtered.

"Kill me and there goes your *caro,* as well as your telephone system and your only chance to wrap up all the industrial secrets in one big bundle," Jason said, looking around for something heavy to swing.

A gigantic explosion slammed into the room; a crack appeared in one wall and dust floated down from the ceiling. There was the sound of snapping small arms fire in the distance.

"It worked!" Jason shouted with unrestrained glee and hurled a heavy roll of wire at the startled men in the doorway and followed instantly after it in a headlong dive. There was a flurry of action, most of the damage being done by his boots, then he was through and running out of the throne room with the men bellowing in pursuit.

A small war seemed to be raging ahead, the sharp explosions of gunfire being mixed with the heavier thud of bombs and grenades. Walls were down, doors blasted open while confused soldiers rushed in panic through the clouds of dust. One of them tried to stop Jason who kept on going, carrying the man's club with him. Sunlight shone ahead and he dived through a riven wall and landed, rolling in the open ground next to the dock. A

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spaceship's lifeboat stood there, still glowing hot from the speed of descent, and next to it stood Meta keeping up a continuous fire with her gun, happily juggling micro-grenades with her free hand.

"What were you waiting for," she snapped. "I have been in orbit over this planet for a month now, waiting for some word from you. There are dozens of radio transmitters on this continent and I have been monitoring them all." She fired a long burst at an upper story where some bowmen had been foolish enough to appear, then ran to Jason, eyes wet with tears. "Oh, darling, I was so worried."

She held him—with her grenade-throwing arm—and kissed him fiercely. She kept her eyes open while she was doing this but only had to fire once.

"Jason!" a voice called and Ijale appeared, half-supporting the still dazed Mikah.

"Who is this?" Meta snapped, the chill back in her voice.

"Why—just someone I know," Jason answered, smiling insincerely. "You should recognize the man, he's the one who arrested me."

"Here is a gun, you will want to kill him yourself."

Jason took the gun, but used it to clear a nearby rooftop, the powerful kick of the Pyrran automatic was like a caress on the heel of his hand.

"I don't think I want to kill him. He saved my life once, though he has tried to lose it for me a dozen times since. Let's get upstairs to the ship and I'll tell you about it. There are more healthy spots than this to have a conversation."

XII

Washed, shaved, scrubbed, cleaned, filled with good food and slightly awash with alcoholic drink, Jason collapsed into the acceleration couch and firmly swore that life was worth living after all.

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"You can't appreciate the simple things of life until you have gone without them for a while. Or the better things either." He reached out and took Meta's hand. She pulled it away and few more digits into the computer.

"How did you find me?" he asked, trying to discover a subject that she might warm to.

"That should be obvious. We saw the markings on the ship that took you away and charted a directional trace before it went into jump-space. We identified the markings and I went to Cassylia, but the ship had never arrived there. I back-tracked the straight-line course and found three possible planets near enough to have registered in the ship during jump-space flight. Two are highly organized with modern spaceports and would have known if the ship had landed. It hadn't. Therefore you must have forced the ship down on the planet we just left. And once you were there you would find one of the radios to send a message. Which is what you did. It is obvious. Who is she?" The final words were in a distinctly chillier tone of voice, and there could be only one she, Ijale, who crouched across the room, obviously unhappy and wide-eyed with fear at this voyage in a spaceship, not understanding the language the others spoke.

"I've told you before—just a friend. She was with us, and helped us, too. I couldn't let her go back to the life in the desert, it's more brutal than you can possibly imagine. There is an entire planetful of slaves back there, and of course I can't save them all. But I can do this much, take out the one person there who would rather see me live than die."

"What do you intend to do with her?" The sub-zero temperature of Meta's voice left no doubt as to what she wanted to do with her. Jason had already given this a good deal of thought, and if Ijale was going to live much longer she had to be separated as soon as possible from the deadly threat of female-Pyrran jealousy.

"We stop at the next civilized planet and let her off. I have enough money to leave a deposit in a bank that will last her for years. Make arrangements for it to be paid out only a bit at a time, so no matter how she is cheated she will still have enough. I'm not going to worry about her, if she was able to survive in the *kreno* legion she can get along well anywhere on a settled world."

He could hear the complaints on when he broke the news to Ijale, but it was for her own survival.

"I shall care for and lead her in the paths of righteousness," a remembered voice spoke from the doorway. Mikah stood there, clutching to the jamb, a turban of bandages on his head.

"That's a wonderful idea," Jason agreed enthusiastically. He turned to Ijale and spoke in her own language. "Did you hear that? Mikah is going to take you home with him and look after you. I'll arrange for some money to be paid to you for all your needs, he'll explain to you what money is. I want you to listen to him carefully, note exactly what he says, then do the exact opposite. You must promise me you will do that and never break your word. In that way you may make some mistakes and will be wrong sometimes, but all the rest of the time things will go very smoothly."

"I cannot leave you! Take me with you—I'll be your slave always!" she wailed.

"What did she say?" Meta snapped, catching some of the meaning.

"You are evil, Jason," Mikah declaimed, getting the needle back into the familiar groove. "She will obey you, I know that, so no matter how I labor she will always do as you say."

"I sincerely hope so," Jason said fervently. "One has to be born into your particular brand of illogic to get any pleasure from it. The rest of us are happier bending a bit under the impact of existence, and exacting a mite more pleasure from the physical life around us."

"Evil I say, and you shall not go unpunished." His hand appeared from behind the door jamb and it held a pistol that he had found below. "I am taking command of this ship. You will secure the two women so that they can cause no trouble, then we will proceed to Cassylia for your trial."

Meta had her back turned to Mikah and was sitting in the control chair a good five meters from him with her hands filled with navigational notes. She slowly raised her head and looked at Jason and a smile broke across her face.

"You said once you didn't want him killed."

"I still don't want him killed, but I also have no intention of going to Cassylia." He echoed her smile and turned away.

He sighed happily and there was a sudden rush of feet behind his back. No shots were fired but a hoarse scream, a thud and a sharp cracking noise told him that Mikah had lost his last argument. ■

IN TIMES TO COME

Continued from page 38

dehydration. As Northern California has just about enough water to meet its needs, while Southen California faces serious thirst in the near future, but the Washington-Oregon area has a surplus . . . now! So if Northern California's water is shunted south, and then the surplus from . . .

There's a limit to how far that can go. And then there's the problem of what you do when you've stretched everything as tight as you can, and are scrabbling for a bit more . . . and a disaster hits the system.

There comes a point when you're already stretched to the elastic limit. Just a small blow, then . . .

It's the trouble with complex systems; any complex system is in constant danger of going not a bit at a time, but in one grand—or hideous—smash. ■ The Editor.

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continued from page 16

society, is the master. It depends on your point of view. You may say, who wants to live in a place where the temperatures are so extreme? The Eskimo will reply that every land demands its price—heat, humidity, rain or social strife; the mere cold of the Arctic winter is a small price to pay for the overwhelming satisfactions of the Arctic.

And the so-called primitives do stay in their own environment—if the white man allows him to do so. They move if the sophisticated white man proves that there is no longer any fulfillment in the hinterland; if the white man turns the primitive homeland into an intellectual, cultural and economic desert surrounded by the white man's plenty. Then the educated primitive moves.

The ideal in the Canadian Arctic is not to force the Eskimo to move, but to let him find a fulfillment in the kind of environment he wants. It may sound like a noble thought, and it is, but it has its practical aspect. The Canadian north happens to be rich in natural resources, and well educated Eskimos can do a better job of developing the resources than people who move up from the south for their own private wars against the apparent harshness of the elements.

Eskimo youngsters are now getting ready for these new careers in the Arctic, if they want them. A lot will prefer some sort of living on the land, a better living than their forefathers knew because of the application of modern technology and because of a lessened pressure on the limited wildlife resources. The education the white man gives must be just as useful for these young people as for the future Eskimo nuclear physicists, mining engineers and oil geologists. The education must also take into account that there is no guarantee that mines and oil wells will spring forward at will. You cannot train people only for jobs which may not always exist.

Perhaps all this is too idealistic, too complicated, too costly for the sake of the three or four thousand school-age children in the whole Canadian Arctic. But what are the alternatives? There are two. One is the age-old answer which the white man has given from pole to pole and around the equator: don't educate them. This is the noble-savage, or the they're-much-happier-as-they-are school. Many white men favor it, but we haven't met many Eskimos who do. Even if we, in this enlightened age, saw nothing wrong with forcing all Eskimos to be our hewers of wood and drawers of ice, it just won't work. That blissful system depends on keeping the Eskimos isolated and keeping them ignorant. The world has shrunk too much for that. Even the Eskimos have heard some of our radicalism about all men being free and equal: they are in danger of taking it seriously.

The other alternative is to forget the primitive heritage, and get on with the job of education. See that everyone learns English and give them the best education we can provide. Then they can compete with us for any job they like. That sounds pretty generous.

Well, it may be a lot more generous than what we have done to primitive races in the past, including the Eskimos, but it isn't enough for them, or for us. As far as we are concerned, we have not the right to take on the role of master race, and decree the eclipse of any other people's works. That's a moral question. There's another very practical point: The Eskimos will contribute more to the common good, to the country or the free world—if you will—if they do not lose what twenty centuries of conquering an Arctic environment has taught them. It would be the supreme tragedy, from a material viewpoint, if we made them lose all that just when we are ready to exploit the physical richness of their homeland.

This process of education is well under way, and a lot of it happens outside the schoolroom. The schoolroom is a recent innovation, by and large less than a decade old: it will still be another five years until there are enough classrooms for all Eskimos to enter. The education started when the first white man came, and in the rather haphazard nature of that contact, the lessons the Eskimos learned were both good and bad.

For example, they learned Christianity. In lonely and remote communities, the sight today of the two churches, Roman Catholic and Protestant, a hundred yards and a dogma apart, is a symbol of the early attention the Eskimos were given when virtually no other whites except the trader were around. In some communities, most of the Eskimos joined the Protestant camp, and in other the Roman Catholic was in the majority. The spiritual competion may have seemed strange to the Eskimos who had not developed religious groups, but it was an introduction to the white man's ways which he was now prepared to share.

No one will doubt the value of the new religion, but the manner of its presentation indicates the white man's methods of acculturation. Christianity borrowed for its outward forms heavily from the non-Christian traditions which surrounded its birth and development. In many circumstances its teachers have conveyed its lessons in terms of civilizations far different from the one which existed in the eastern Mediterranean twenty centuries ago. In the Arctic, however, the teaching embodied cultural aspects beyond the common ken of the new converts. There aren't many oxen and asses on the ice-cap, and fish is far from the Arctic staff of life. And some of the puzzles go deeper.

"I have often wondered at the Christians," wrote an Eskimo of Greenland to his friend Paul Egede, son of the great eighteenth century teacher and missionary. "My countrymen know nothing either of God or a devil, believe neither in punishment nor in reward after this life: and yet they live decently, treat each other kindly, and share with each other peaceably when they have food to share . . ."

"Murder is very seldom heard of amongst us . . . (We) make no boast of it, and do not give thanks to God for

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it like the great lords in your country, when they have killed all the people in another land, as D. has told me. It surely cannot be to the good God of whom you teach us, who has forbidden us to shed blood, that they give thanks and praises; it must be to another who loves slaughter and destruction . . . I hope you will explain this to me at your convenience."

There were other puzzling points, and sometimes the primitives failed to understand the real lessons that their teachers sought to convey. Twenty years ago, within a morning's flight from one of North America's largest cities, a series of murders was committed in the name of the new religion by simple people who believed they saw the Second Coming. These were people who were being deprived too quickly of the old, before they had absorbed the new.

It is always difficult to know what lies embedded in the bottom of men's minds. The extent to which the old beliefs have been expunged is a question which only each individual Eskimo can answer—and perhaps even he cannot. There is lots of evidence that the old beliefs are a substantial source of comfort and guidance in the difficult situations of today. Perhaps there were no atheists in the trenches; in the crises of Arctic living there may not be many who have turned their backs completely on the animistic religion which succored the Eskimos these countless generations.

The outward forms of the new teaching have certainly been successful. The national census does not acknowledge a single Canadian Eskimo as being anything but a believer in one of the two denominations which have been in the north the best part of the past century. Sabbath observance is preserved in some Arctic communities to a degree that would be unheard of in almost any other North American community. The traditional folk dances, have been deplored to the point of virtual extinction because of their associations with pagan ways. Rock and roll or the twist, however, are associated with a respectable civilized Christian society.

Any people must find some outlet in song and dance, especially a people with few recreational outlets. With the drum dance banned, the substitute often was nineteenth century English hymns. Whatever their undoubted value, they may not always satisfy the buoyant spirits of a people for whom life is short and the next hunting success uncertain.

What happens when selfless men of good will come upon a group of unspoiled savages? Do they hope always in their hearts to find, or establish, a kingdom of heaven that has eluded European civilizations since the white man first heard the Sermon on the Mount? Do they sometimes wonder why so often their great sacrifices are ultimately overshadowed by indifference, ingratitude, by violence and strife? From the missionaries we can learn more than from anyone else the problems of bringing our civilization to other people. Whether they knew it or not, few missionaries brought a religious teaching alone. They taught an ennobling way of life, and in so doing they taught the way of living they knew best.

They taught the primitive how to dress, almost as though the current fashions of western Europe or America had been sanctioned by scriptures. They taught the Africans and the Hawaiians to wear more clothes than the one which the climate had designed for them. In the Arctic, they taught that women should not wear pants. Of course, the Eskimos might suffer in their death struggle with the Arctic cold when they discarded their sealskin trousers, but the new flimsy skirts were more acceptable to the sartorial standards of the white man's drawing room.

And yet, much later than the Eskimos, Christian women of North America learned that pants were virtually essential to many activities in life. Women's pants were accepted by the elite hunting classes who were the main support of the established church in England when the same sartorial trend was being represented as the work of the devil in the Canadian Arctic. Gradually the rest of the world learned that it is neither immoral nor un-Christian for women to wear pants for winter sports, just about the time that the Eskimo women were being told that the same wear was quite out of question for winter work.

This is confusing to Eskimos.

But the white man brought more than moral or spiritual values. He brought the rifle. The strange decline of the caribou herds was not easy for the Eskimo to understand. Apart from everything else, he didn't count above twenty. Now we are teaching him to count, but alas when there are so few animals left for them to tally.

We are bringing a broader lesson in conversation, based on persuasion and explanation. Back of all the educational process, though, are the teeth of the law. The white man is prepared to enforce the law against the Eskimo for his own good in order to correct a situation which the white man created. If this isn't paradox enough, consider those teeth which the law possesses. Fines don't mean very much in areas where money is so scarce that government relief is the only real surety against starvation. But there is prison. Now, there is a threat—being taken away to a large warm house, to sit out carefree, well-fed days while the government looks after one's family in the absence of the convicted breadwinner.

This is puzzling to the Eskimos.

All this may indicate that the Eskimo is moving in confusion from cloud to cloud amidst the incomprehensibles of the white man. Not at all. He has been able to exploit to great advantage much of what the white man has brought. The average Eskimo has proved himself a superb mechanic, mastering with apparent ease the intricacies of the machinery that has arrived in the Arctic. He is resourceful, imaginative, persevering—most of all, he has wondrous powers of concentration born of his particular type of hunting life. He dissects a clock or a tape recorder so that its anatomy is as familiar to him as a seal or a walrus. And he reassembles it with unerring

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fidelity. If there is no spark plug for the motor on his boat, he may fashion one from purest ivory and native copper.

Then he is a superb mechanic? No, not entirely. Few Eskimos have learned the necessity of maintenance. You fix a thing when it goes wrong, not when it is working. Maintenance is all tied up with the white man's parsimonious taking thought for the morrow. To the Eskimo, the morrow will take care of itself: the seal will come, or it won't. Why worry? Why be impatient? Why be angry? These are childlike emotions which cannot be afforded in this short life.

We may feel we are on sure ground when we teach the Eskimos about the machines of our civilization, but there is a lot for him to learn about the use of his own resources. The Arctic char grows and reproduces very slowly, and it will never be a product for exploration on a vast scale. But Arctic char is one of the most delicately flavored fish in the world, and with proper handling it can bring a substantial income. The Eskimos used to feed it to their dogs. Now they have to be taught a new set of values, not only gathering and freezing the char with infinite care but switching around all the old ideas on use of local foods. In some places, Eskimos could sell their char through co-operatives in large North American markets, feed their dogs on imported chicken and still be ahead of the game financially. Still, when the seals show up, there may still be a wild exodus from the fish nets and freezing plant. Not all the Eskimos' equations are based on material values.

And if we try to impress the Eskimo with the importance of maintenance, of money income, of sacrificing today for a brighter tomorrow, he is quite apt to quote to us the scripture which we taught him.

It is confusing to everyone.

Yet do we dare let education kill his philosophy in order to bring order to the Arctic? There was something of value in the Eskimo tradition, and there still is. Every Arctic traveler praises the character of the Eskimos, their spirit of co-operation, generosity, their cheerfulness and calm in adversity, their even temper—indeed, so many of the Christian virtues.

Character is something of value, but there is more. Look at the total Canadian Eskimo population—less than twelve thousand, hardly enough to populate one respectable town. Yet from their ingenuity has come a host of inventions. Here is a mighty good testimonial to the people who, if not made into carbon-copy white men, can play a big part in solving problems of Arctic technology in the bright, resource-filled future.

We must look at the art. Eskimos have been carving in stone from the beginning of time: carving as though their life depended on it. Not all the carving was functional. Some pieces depicted the animals of the lands and seas. Maybe these figures were intended in part to invoke the spirits of those animals for the success of the hunt, but surely in part they were a creation of man-made beauty in a land where all other beauty is nature's, carved in infinite proportions.

White men, who knew no better, picked them up as souvenirs, or, more often, didn't bother picking them up at all. It was not until almost the mid-1950s that the world outside the Arctic heard of them. Then, in one hour of shocked success, the world acknowledged that the Eskimos were without peer as artists in their medium. Galleries across North America and Europe vied for their work; the most renowned sculptors spoke in admiration and almost in envy of how the Eskimos had solved their artistic problems.

Suddenly the Eskimo was the master. The white man was the disciple.

The Eskimos saw the white man's printed pictures and asked about the process. They proved that the same talent which wrought such wonders in Arctic stone could be applied with equally dramatic success to the white man's media, with some ideas of their own. They experimented with stone block matrices and sealskin stencil. The sudden emergence of the graphic art of Cape Dorset three years ago is one of the great success stories of modern art.

Now they are studying etching, and they are moving into literature. The Eskimos of Greenland have been writing for a long time, but in Canada Eskimo literature is very new. Half a century ago the Eskimos got a syllabic form of writing from the white man and into it were translated the English texts which the white man thought the Eskimo should read. The writing system was cumbersome, and it was not universal amongst all Eskimos. Now the Canadian government is reaching the culmination of years of study of a new Eskimo orthography in collaboration with Eskimos across the north. This will permit all Eskimos to communicate with one another and to publish their own material with a minimum of technical difficulty. Already they have their own "little magazine" written by and for Eskimos. Articles and drawings from it have been translated and reprinted in the magazines of the white man.

Isn't this the most puzzling part of all in the change that is now enveloping the Arctic? Here is a cultural renaissance, coming just at the time that the white man's presence seems so overpowering. Why didn't the Eskimos disappear, except as a memory, like so many of the world's primitive peoples who have known the invasion of the white man?

Maybe one reason for the cultural renaissance is that after all these centuries of trial and error, modern man is at last beginning to grasp a little of what should be meant by contact between civilizations. Perhaps when we teach the Eskimos we'll intimidate them, when we do not mean to. Perhaps we'll give them far more of our life than we should, and understand far less of theirs than we ought.

However imperfectly the white man manages the job, there are encouraging signs that this new approach to the dignity of man pays dividends. It may even work.

It may even civilize us a little.

And that might be the strangest change at all. ■

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BY JOSEPH GOODAVAGE

REPORT ON CRUCIAL EXPERIMENT NO. 6

MARCH

ASTRO FORECAST

Cold air masses will center over the northern Appalachians through New England on March 1st. Temperatures will rise moderately over the Ohio and Tennessee Valleys under returning southerly air flows. Light rain or snow is scheduled over the lower lakes region on the 3rd, with snow over New England elevations on the 4th.

During most of March, ice and snow will cling over the Great Lakes region, with heavy accumulation of snow in Michigan, Wisconsin, the upper Ohio Valley and the southern and eastern shore areas of the lower lakes.

Except for below normal temperatures in the mountains and higher elevations, March weather will be nearly normal across the Western third of the nation.

Over the Eastern states especially, the higher levels of the atmosphere will be much colder in March.

Low pressure stemming from the southern Pacific coast on March 4th will center over the lower Mississippi Valley early on the 6th and *intensify* over the South Atlantic states. If a soothing high pressure area doesn't upset normal timing in eastward transit, this disturbance drifting along the Atlantic coast can spill snow over inlands north of Chesapeake Bay late on the 7th.

ACTUAL WEATHER

Where precipitation fell as snow, amounts were often heavy. Vincennes, Ind., was covered with a 10-inch fall on the 1st. Like amounts were measured in all states to the north and east of Indiana. Boston, Mass., had a 9-inch snowfall on the 2nd, as 4 to 10-inches fell over most of the southern interior of New England and much of New York and Pennsylvania.

Lake Michigan was frozen clear across from Milwaukee, Wis., to Muskegon, Mich. for the first time in twenty-seven years. Inland rivers, lakes and streams in the Northeast and Ohio Valley remained frozen. Snow and ice covered most of the Northeast.

The mountain snowpack of the Far West was below normal due to a combination of unseasonable warmth and little precipitation.

New daily lows were set at many stations in the Great Lakes and East Coast States throughout March.

Heavy to excessive rains fell over a large area from the central great Plains eastward, extended over much of the Northeast. Amounts exceeding four inches fell in Arkansas, Georgia, South Carolina, North Carolina, Tennessee, Kentucky, West Virginia and Ohio as the storm passed from the Midwest on the 4th, north of Chesapeake Bay on the 5th and 6th and through New England on the 7th.

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East of New England this storm will be whipping the ocean with gale winds in erratic gusts on March 8th. Wind-blown snow over the central Rockies on the same date.

This storm, which also gave heavy snows to New Mexico and Colorado, left heavy amounts ranging from the central Rockies to New England. By March 9th, over 12 inches of new snow had fallen near Lake Ontario and through New York; 10-inches in New England.

If the depression swinging eastward from the Central Mississippi Valley on the 13th or 14th is rain, it will turn to snow east of Pittsburgh late on the 14th and reach New York by the 16th. The change will be due to colder night temperatures.

As a storm moved from the Central Rockies to the Western Great Lakes on the 15th, it dropped up to 1-foot of snow in Dakota, set off severe storms from Iowa and Missouri eastward, and left excessive rainfall amounts over most of the Ohio and Central Mississippi Valleys and eastward into New York on the 16th. (Note: precipitation fell as *rain*, not snow as expected.)

After the 17th there will be an increased warming trend over the southeastern states; at the same time, cold air masses will develop maximum intensity east of the Appalachians into New England.

Early warmth gave way to midweek cooling east of the Rockies as a storm moved east-northeastward from New Mexico on the 18th, and over New England to sea on the 20th.

During the last week of March, a storm system whose battering winds will strike the Pacific Northwest is quite likely to be the most severe stormy weather of the month.

Coastal Washington experienced the passage of a major storm front during the final week of the period.

. ... On the 21st, temperatures will change once more in upper New York and New England in Old Man Winter's dying gasp. With the Spring Equinox occurring on March 21st at 3:20 a.m., E.S.T. however, this storm should reach New York—though in a more complex pattern—also on the 21st.

Showers generally and thunderstorms locally in eastward trek from the Mississippi Valley through New England on the 21st and 22nd.

At the New Moon on March 25th, as determined from stationary key charts, the Moon will be within 24-hours of its perigee and the greatest tidal pull will be felt on the Pacific coast. Moreover, the Mercury equinox and the Sun's superior conjunction, with Mercury to follow, will also be triggered over that region. With resulting high tides, storm activity and powerful winds after the New Moon—on the 25th at 4:10 A.M. P.S.T.—on the north Pacific coast, this should be an excellent opportunity to test the validity of the theory.

Almost daily precipitation over the entire Pacific Northwest totaled five inches of snow in the higher elevations and coastal locales. In Washington, new snowfall increased depths by 20 to 40-inches. High winds accompanied the stormiest week of the season; by the 27th it had moved into Oregon and through North Dakota by the 29th. Nearly all of the Far West had measurable precipitation as this system passed.

This storm, preceded eastward by rising temperatures, is due to reach Chicago early on the 27th, with winds accelerating in eastward transit over the lower lakes region, reaching Boston late on the 28th.

Hailstorms dropped stones the size of golf balls in Minnesota and Illinois on the 26th. Hail 3-inches deep near Springfield, Mo. Paducah, Tex., hit by hailstones two-inches in diameter while drenched with 1.22 inches of rain in 22 minutes. Locally severe storms through W. Va., Penna. and along the Atlantic coast from the 26th to 28th.

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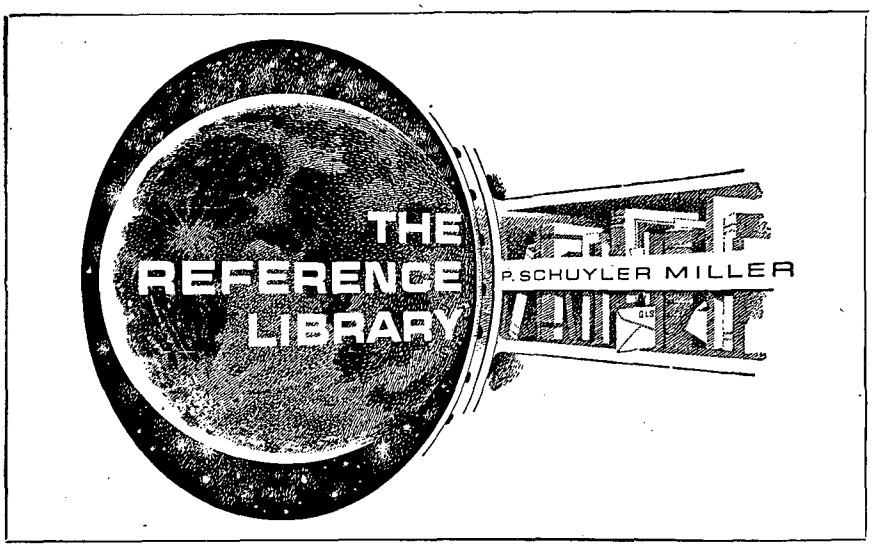

THREE DEBUTANTES

Drop the three names, "Cordwainer Smith," Katherine MacLean and Rosel George Brown, in any circle of science-fiction enthusiasts, and they will be identified immediately as three of the consistently best writers we have around. It is purely amazing that—although they are all well represented in the best anthologies—none of the three has had a book of his or her own until now. This is in part, of course, because they are primarily or exclusively short-story and novelette writers, and their best *is* in the anthologies, but this has not stopped publishers from putting out vastly inferior collections of stories by vastly inferior writers. Now, all at once, the oversight is remedied and we have books from all three.

Debutantes they may be, technically—or two debutantes and a debutant—but newcomers they are certainly not. That is apparent as soon as you open any of the three books. They are, antialphabetically, in the order I intend to discusss them, Cordwainer Smith's "You Will Never Be the Same"—Regency Books No. RB-309, 156 pages, and 50 cents—Katherine MacLean's "The Diploids"—Avon Books No. G-1143, 192 pages, 50 cents—and Rosel George Brown's "A Handful of Time" from Ballantine Books—No. F-703, and also 50 cents.

According to the editorial notes in Judith Merril's "7th Annual of the Year's Best SF," "Cordwainer Smith" is the pen name of a Professor of Sociology and State Department advisor who has never—my comment this time—published a bad story in ten years. In this collection, eight of his stories have been slightly modified to give them a kind of continuity and common theme—the mechanization of man through some thirteen thousand years or more of the future. Most of them are familiar, and all of them read just as well the second, or third, or fifth time as when you saw them first.

Cordwainer Smith is a kind of Bradbury with a difference. He looks at men and worlds with a poet's subtlety, and sees more than Bradbury has ever showed us. He uses style as an instrument, instead of thrusting it out for its own sake. And if you do not precisely remember his characters as people, you certainly do remember them.

The linking theme of the eight stories is the evolution of the symbiotic relationship between men and machines, until it is difficult to say which is which. Apropos of this, have a look at an essay by J.B.S. Haldane in Part B of "Penguin Science Survey 1963," in which he suggests that if computers ever have components comparable in size to the cells of a human brain, they may have "life" and "mind" like our own.

In "No, No, Not Rogov!" the process has just begun. The Russian scientist, trying to build a telepathic eavesdropper, connects himself into a mental network that spans the universe. In "The Lady Who Sailed the Soul" we first encounter the pain and horror of the Up-and-Out through which men must pass to the stars, and the sailors who become machines to pilot them. "Scanners Live in Vain," oldest of the eight, has a little more overt plot and introduces the dichotomy of the habermans—men made into robots as punishment—and the Scanners, the voluntary man-machines who control and judge them ruthlessly. "The Game of Rat and Dragon," probably the best known of the stories and an all-time classic, develops the concept into the warmer, less cruel partnership of the pinlighters and the cats who fight mind-beside-mind against the nightmarish monsters of the Up-and-Out, and "The Burning of the Brain" passes on to the Go-captains whose minds *are* their ships. "Golden the Ship Was—Oh! Oh! Oh!", least of the eight, carries this aspect into a war between the stars.

In the last two stories we pass on into the very far future and leave the man-machines for the utterly strange world they serve. "Alpha Ralpha Boulevard," another of my favorites, is so rich with subtle bizarrities that there is something new to find in every rereading—and its strangeness grows as well. Here men are playing at being men, in a stage-set world of homunculi and forgotten memories. Last of all, "Mark Elf" carries a child of Hitler's Germany into this world where the fantasies of the brothers Grimm have become fact.

The publishers have the perfect title: you will never be quite the same after reading these stories.

With Katherine MacLean—no stranger here, where four of the eight stories were first published—we have a totally different literary personality. "The Diploids"—both the collection and its long title story—could be handed to any inquirer as an epitome of present-day science fiction. These are stories with plots, and the plots involve scientific concepts intimately and essentially. Often as not, they also illustrate "Merril's First Law of S-F

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Psychodynamics," that "For every shift in outlook, there is an equal . . . shift in insight." You'll find, too, that if the people in the stories are not particularly memorable, they are completely real and natural when you're with them.

The long title story is built around a medical-biological idea, as are many of the stories in the book. It proposes that human embryos can be raised and sold as experimental animals, with controlled lineages every bit as specific as those of white rats or hamsters, by duplicating half the chromosomes of a male or female gamete. Inevitably some of these laboratory specimens will be allowed to mature—and some will be geniuses who feel an innate right to impose their superior will on ordinary mankind. "Defense Mechanism," which follows, was here in Astounding in 1949, and it's still remembered. In it a telepathic infant begins to explore the world by sampling the minds around it—and learns to defend itself.

"The Pyramid in the Desert" was called "And Be Merry" when it was here in 1950. In it a young woman attempts to put an end to the aging of her body, with disastrous results. "The Snowball Effect," on the other hand, is a sociological farce, very light and very slight—call it the threat of the perfect sewing circle. "Incommunicado," here in 1950, suggests the "Cordwainer Smith" themes but with a totally different approach that is all MacLean and not at all Smith. It suggests a fascinating new solution to the problem of data retrieval that is driving both scientists and librarians mad.

"Feedback," in Astounding in 1951, sketches the bitterly stark portrait of the Conformist Society with an economy that few other writers have matched. It is probably the most memorable story in the book, relieved a little by a twist at the end which goes a step beyond the bald horror. "Games" is a kind of companion piece to "Defense Mechanism," though its telepathic child is a little tougher than the baby in the earlier story. And the collection closes with "Pictures Don't Lie," a "gimmick" story about visitors from space, which is so convincing that most scientist-critics take extra pains to explain why it couldn't possibly come to pass.

Rosel George Brown has been a professional writer longer than either of the other two, but primarily in fields other than science fiction. I suspect, too, that many readers have confused her with Fredric Brown because of the pervading humor of her plots and situations. Most of the twelve stories in "A Handful of Time"—two of them brand new—*are* situation bits, but their people are real enough so that their slightness shows only in retrospect. You're right with them, all the way.

The collection opens with "Lost in Translation," an impudent bit in which a self-impressed intellectual damsel finds Pericles' Athens very different from the books. "Step IV" is an idyl of young love and sacrifice on a Latinized world—that snaps like a trap at the end. "A Little Human Contact" projects today's child-rearing problems into the future, and ameliorates them with the help of a relic of the outmoded past.

"Signs of the Times" is an inconsequential little gimmick yarn, and "Of All Possible Worlds" is a mild variant on the alien-culture-with-a-bolthole plot. The humor is back in "Just a Suggestion," the parable of Downgrading, and it is stepped up to a full chortle in "Save Your Confederate Money, Boys," with the most outrageous family since the Hogbens. Faculty folk will be grinning appreciatively with "Visiting Professor," who comes from the future and is not impressed with mid-twenty-first-century Americans. This and "Car Pool," in which future suburbia copes with a sensitive extraterrestrial child among human junior savages, are companion pieces to L. Sprague de Camp's recent collection of memorabilia of future exurbia.

"Fruiting Body" is a grotesque, quite unlike any of the others—the story of a biologist who achieves a symbiosis between a fungus and his beautiful but boring wife. The wry humor saves it; treated as horror in the old *Weird Tales* manner, it would have been ridiculous.

Finally there are the two new stories. "Smith's Revenge" is perhaps a hybrid with the author's detective-story alter ego: an academic murder with the corpse eliminated via time machine. And "The Devaluation of the Symbol," good-humored as it is in handling, comes uncomfortably close in its suggestion of the future of our commercial-conditioned society.

Appearing by coincidence, almost at the same time, these three nominally "first" books cover almost the full range of present-day science fiction, from the poetic near-fantasies of Cordwainer Smith, through the straightforward science fiction of Katherine MacLean, to the mockingly gentle distortions of Rosel Brown. I recommend them as a "package."

THE MEASURE OF THE MOON
by Ralph B. Baldwin
University of Chicago Press. 1963. 488 pp. $13.50

The author of this massive and varied tome is a varied individual, a physicist whose wartime work on the proximity fuze brought him a presidential citation, a former university teacher, the standard-bearer of the school of astrophysicists who believe the craters of the Moon are meteorite scars, and now vice president of the Oliver Machinery Company. This new book is a supplement to his "The Face of the Moon," which came out in 1949. It is not a book to read for entertainment; rather it is a reference and compendium, which brings up to date our knowledge of the Moon, and fits this knowledge into the author's evermore-plausible theories. The treatment is mathematical and statistical in spots, and straightforward througout, but it is also very clear.

Of special interest to readers of Analog should be the growing roster of probable and possible terrestrial meteoritic craters, "discovered" in the last decade or so because people went out to look for them, and because—particularly in Canada—there is good new aerial photography to reveal these

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structures. Meteor Crater in Arizona is one of the youngest; there are craters in both Canada and the United States which are filled in with rocks hundreds of millions of years old.

Another point of interest: the older books objected to the explosion theory—in an impact crater, produced by the collision of a large meteorite or planetoid with a planet, the rock explodes—because "all" lunar craters have central peaks, and terrestrial explosion or impact craters don't. Well, all lunar craters do *not* have peaks, as the photographs in this book or the topographic maps of the Moon now being published by the U.S. Air Force show very clearly. Baldwin interprets the peaks as rebound structures, produced through the millennia by isostatic forces seeking to relieve the strains in the rocks under the crater. "Frozen waves" in the rock, like ripples in water, surround the craters on both Earth and Moon, and on Earth there are other newly discovered telltales—shatter cones in the rock, and high-pressure forms of quartz.

The anti-impact school, which includes the English astronomer-writer Patrick Moore and most of the Russians, has a lot to explain away.

KEY OUT OF TIME
by Andre Norton
World Publishing Co., Cleveland. 1963. 224. pp. $3.50

In parts of this fourth book in the "Time Traders" series, Andre Norton comes as close to the magical mood and manner of A. Merritt as anything we have had in years. To some, I know, this is not a recommendation; they resent magic, and the spell cast by words. But Andre Norton uses words more sparingly than Merritt did, and this book may be just the place to try their savor.

The four books, nominally juveniles, are adventure stories which span time and space, great mysteries and strange races. In "The Time Traders," Ross Murdock, hero of the new book, went back into Bronze Age Europe disguised as a wandering trader, in search of the wrecked starship from which Soviet scientists were harvesting dangerous scientific secrets. His success brought mankind of our day in contact with the star-roving, hostile empire-builders of the far past, the Baldies.

In "Galactic Derelict" a young Apache anthropologist, Travis Fox, went back into the American southwest of ten thousand years ago to find other Baldy ships—and be snatched away in a wild tour of the universe with stops on world after fascinating world. In "The Defiant Agents," Fox and his Apache kinsmen were sent to colonize one of these worlds, Topaz, and found that the Reds had sent Mongol pioneers to claim it. Now, in the fourth book, Time Agents Ross Murdock and Gordon Ashe are back again, aided by a young Polynesian girl and her team of telepathic dolphins, to probe the mystery of another of the star-worlds, the sea-planet men have named Hawaika.

Hawaika is one of the worlds marked in the Baldy star-atlases—but the cities and civilizations it must have had ten thousand years ago have vanished. Murdock, Ashe and Karara go back—rather, are snatched back—through a Time Gate, and marooned in the midst of the struggle for power that must have destroyed the planet. There are two divisions of the feudal native race, the land-based Wreckers with their castles on the crags and the piratical Rovers. There are the Baldies, hidden in the background, manipulating peoples and worlds for their own unknown purposes. And there are the Foanna, an ancient people who may have been or be as powerful as the Baldies—and who may be the mysterious lost race whose traces we have seen in others of Andre Norton's fascinating books.

Complainers have said there is "nothing new" in the plots of these books. If they want van Vogtian entanglements or world-shaking "revelations," they are right. But the richness which Andre Norton lavishes on her portraits of the wonder-worlds of the Universe, the subtle warmth of the empathic relations she portrays between men and mutated animals such as Karara's dolphins, and above all the mysteries she suggests and half-reveals but does *not* explain away with glib rationalizations—these, in the words of another book, are *stories*, O my brothers!

FIRST THROUGH TIME
by Rex Gordon
Ace Books, New York. No. F-174. 1962. 160 pp. 40¢

"First on Mars," the first novel by this English writer, was one of the best books of its year. The English title, "No Man Friday," described its theme of one man alone on Mars. Gordon's second, "First to the Stars," was something of a letdown. Now he is back in good form with "First Through Time," though the book is still not the stunner that his Martian story was.

Why the author has used an American setting for his book, I don't know. It is barely possible that the publisher has moved it, and perhaps more likely that he was asked to make the switch from an England that he presumably knows well. Howbeit, U.S. government scientists are experimenting with a particle accelerator in a cave in Tennessee when they discover that a bubble of space at the focus of their beam is apparently being transferred into the future. They send an automatic motion-picture camera ahead, and get a film that shows a ruined laboratory, a great gap in the mountain wall, and a strange range of volcanic peaks where the green hills of Tennessee once rolled.

Naturally, a man has to be sent ahead to find out what has happened and what—if anything—can be done to prevent the evident cataclysm. It might have made better sense to send another camera first, to film the catastrophe in the act of happening, but that would simply have stretched out the wordage. So astronaut Howard Judgen rides ahead into a time when a girl scientist's bleached skeleton lies on the floor of the ruined cave, and strange people and a stranger society exist outside.

It's a good story, well handled—straightforward adventure rather than satire, though the question of values

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in human society burrows under the surface of the plot. It's a pity that it came out so late in 1962, for it might be a contender for the "Hugo" as best a chance to read it before the end of novel of the year if more people had the voting.

TIME OUT FOR TOMORROW
by Richard Wilson
Ballantine Books, New York.
No. F-658. 1962. 159 pp. 50¢

Having no awesome position in the SF world to maintain, Richard Wilson can relax and roll out satiric entertainments, a dozen of which—from just about every science-fiction magazine except this one—are assembled here for your enjoyment. They originally appeared between 1954 and 1960. Some are almost as short and snapping as Frederic Brown's fulminating bits. One—"Just Call Me Irish"—is literally a shaggy dog story.

In stories of this kind, that are not intended to teach Great Truths or remake society, I look for the plus values. In this lot, the most plus is "QRM" with its utterly believable setting in the newsroom of an international wire service that through an accident briefly taps the lines of a similar service on Venus.

More in the familiar comic Wilson style are the very short "Kin," in which a frustrated extraterrestrial robot tries to communicate with machines on Earth, or "An Abundance of Good Things," in which some of the hazards of bureaucracy louse up quite another kind of invasion. "The Tunnel Under the World," on the other hand, is a longer and quite unbelievable item that is neither honest SF nor honest fantasy; "The Big Fix," on the other hand, is a quite satisfactory hybrid. "Wasp" is a bit too obvious in its parallel between a wasp trapped in a car and a man in a spaceship. "Time Out for Tomorrow," back in the traditional Wilson vein, introduces a real time traveler to a meeting of science fictionists conceivably modeled on New York's Hydra Club. "The Best Possible World" is ingenious but sentimental without quite selling its sentiment; likewise "The Voice of the Diaphragm," whose nostalgia curdles a little.

Plotwise, the most complex of the lot—ideal for a Hollywooder—is "The Ubiquitous You," in which six androids grown from identical cells turn out to have six entirely different personalities. What a triumph for split-screen hocus-pocus! Complicated is also the word for "The Locus Focus," in which a comet's tail is disappointingly dragged in to explain some rather perturbing effects. *That* should show how seriously Mr. Wilson takes all this . . .

THE DRAGON MASTERS
by Jack Vance
THE FIVE GOLD BANDS
by Jack Vance
Ace Books, New York.
No. F-185. 1963. 102 & 122 pp. 40¢

The shorter part of this Ace Double was a single-shot "novel" in *Galaxy* last year. "Five Gold Bands" was a typical *Startling Stories* interstellar adventure yarn back in 1950.

If you missed "Dragon Masters" in *Galaxy*, it is well worth reading here as an off-trail experience along the borderline between science fiction and fantasy. We drop in on mankind in the far future, on a far bleak world, where the expanding wave of human empire has met and broken on the barrier reefs of the reptilian Basics. The first clashes took place long ago; now as the two races meet again, men have bred their Basic captives into many specialized slave-strains and the Basics have done the same with men. Underground are the sacerdotes, who have preserved their warped traditions of the glory of mankind before Aerlith, and on the surface are feudal bickerings that make a united front against the Basics unthinkable. It's a grand, spell-binding job of imagination stretching, rather like "The Dying Earth" in tone.

"The Five Gold Bands" is far more conventional adventure stuff. Donald Tuck's "Handbook of Science Fiction and Fantasy" says there was a previous paperback edition in 1953, as "Space Pirate". Again it's the far future, and mankind, expanding into the galaxy, has bred in isolation into several different and potent strains, five of which maintain a tense alliance and a joint monopoly over the space drive that makes interstellar communication and commerce possible. None of them—Shauls, Kotons, Loristani, Badau, or Eagles of Alpheratz, five races descended from the sons of the space drive inventor—have any use for used-up old Earth. But it is Paddy Blackthorn, a condemned thief from Earth, who kills the Five Sons and steals the five gold armlets that hide the secret of the drive. Then it's in and out of the hostile worlds, quarry of a cosmic manhunt. Swashbuckling fun of the kind that made *Starling* famous, a decade ago.

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THE HAND OF ZEI
by L. Sprague de Camp
Avalon Books, New York.
1963. 222 pp. $2.95

The original version of "The Hand of Zei" was serialized here in Astounding between October 1950 and January 1951. Avalon has chopped the serial into two books, "The Search for Zei" and this concluding volume under the original title.

Krishna is to de Camp as Barsoom is to Burroughs—a planet big enough and strange enough to sire a series of action yarns, in which an Earth-born hero blunders, muscles and connives his way through adventure after adventure. Where Burroughs' heroes were more muscular than smart, and relied heavily on the fact that a Good Guy will always come out on top in a tussle with a Bad Guy, de Campian heroes have muscles but are often too modest to use them, treat their crises more as acrostics than as brawls, and are apt to be startled if a door breaks down when they put a shoulder to it and shove.

In the previous installment—and

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volume—Dirk Barnevelt, tame writer for Shtain Enterprises, is sent to Krishna to find and bring home his company's explorer-founder, captive of the pirates of the Sargasso-like Sunqar. Zei, Princess of Qirib, is kidnaped from under Barnevelt's nose, and as this new book opens he is escaping across the floating weed beds on improvised skis, with the girl but without Shtain. The rest of the book is devoted to the process by which our hero finishes his original job and copes with the problem of not winning the Princess, whose husband will be the entree at his first anniversary banquet.

It's fun on a rather intellectual level of tongue-in-cheek action. I'd rather have seen the less inhibited Polynesian, Tangaloa, get into the act more—but I guess Sprague de Camp just doesn't *feel* like a Polynesian. Too bad.

I hope some paperback publisher puts the two parts of the story back together again. It should make *one* "fun" book.

THE DREAMING EARTH
by John Brunner
Pyramid Books, New York.
No. F-829. 1963. 159 pp. 40¢

John Brunner is one of the "Three B's"—Bulmer, Brunner and Ballard—who stand high in that new group of writers who are bringing English science fiction back to the top of the genre after a generation of American domination. At the moment, the greatest of these is certainly Ballard, but Brunner, if less of an artist with words, is certainly a handy man with a plot and action and this is his best.

It shows us a not-so-far-off future in which the human race has outbred its resources. Eight billion people are bursting the seams of the world and demanding that the United Nations bring back the good old days when there was food enough and housing enough and clothing enough and oil for furnaces and automobiles and power to waste on television and movies. What can be done has been started too late; legal cannibalism grows less of a joke every day. And the narcotics agents of the U.N. have a new drug on their hands, a mescal-like product that induces wonderful dreams, that is being sold at prices even the poorest can afford. One more ingredient: the addicts disappear.

Following the struggles of U.N. agent Nicholas Greville to make sense out of the nightmare in which he is involved—an addict wife, disappearing lab animals, a mysterious cult, the reappearance of one of the vanished "happy dreams" takers, the hostility to the U.N. and all its representatives—we are dragged deeper into a complex situation involving complex people. A few paragraphs back I started to call this "one of" Brunner's best and xed out the qualifier. I'll change again, to "best yet."

THE TWENTY-SECOND CENTURY
by John Christopher
Lancer Books, New York.
No. 74-811. 1962. 190 pp. 75¢

This is the fourth book in the Lancer Science Fiction Library. A "complete and unabridged" tag suggests that it is a reprint; if so, the original edition was English—twenty stories, most of them quite short and slight, with that after-dinner air that the English manage especially well.

The first five stories and one other are a connected series describing certain exploits in the career of Max Larkin, United Chemicals field agent on Venus when we first meet him and later Manager-in-retirement in Italy and off-the-record expert in human relations. These stories are set in a future run by a managerial society. The great industrial complexes—United Chemicals, Atomics, Lignin Products, Agriculture Inc., Genetics—have replaced and exceeded the nationalisms of the Twentieth Century with a kind of clan system that divides the world and completely prescribes the behavior of its members. Max Larkin is the experienced pragmatist and individualist who works outside this clan structure as often as inside it. Always, his greatest asset is his knowledge of human—and in "Colonial," the first story, inhuman—nature. For some peculiar reason, a sixth Max Larkin story, "Balance," twice referred to in earlier footnotes as being in another book, turns up later in this one instead of in its proper place in the sequence. Individually the stories are good entertainment; together they paint a fascinating fresco of a strange society two hundred years from now.

None of the remaining stories is especially noteworthy either, but together they cover most fronts in the SF field, from the slight-and-sentimental "Christmas Roses" and "A Time of Peace" to "Mr. Kowtshook" with its freak-of-good-will from space, hiding out in a small Scottish circus, the fantasy of a-man-is-what-he-eats in "Rich and Strange," the "inside story" of the Loch Ness monster in "Monster," the old warning about ET's bearing gifts, given again in "The $64 Question." There is a space murder story in "Sentence of Death," the puzzle of an ancient culture that seems too primitive in "Museum Piece," and an ode to the homely virtues in "Blemish." "The New Wine" describes a space expedition's return to an Earth where telepathy was "given" to men—and animals. "Weapon" is one of the wryest and best: a glimpse of Twenty-second Century armament. "Rock-a-Bye" and "Begun Again" are semireligious fables about a child born of man and Martian and the last man on Earth. "The Rather Improbable History of Hilary Kiffer" is a very short time-displacement story that begins: "This is a fantastic story, and not in the best of taste."

Max Larkin is said to be his creator's favorite. I would have been quite happy with a book of Larkin tales, probing still deeper into the crannies of the managerial world that we see building up around us.

TRIUMPH
by Philip Wylie
Doubleday & Co., Garden City.
1963. 277 pp. $4.50

Needless to say, Doubleday did *not* send this book out for review with the rest of its science fiction, in spite of its being set in the future, when a

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nuclear slugging match leaves fourteen people alive in the northern hemisphere. Nowadays Philip Wylie is a Big Name, a Thinker and people have forgotten that he had a hand in that landmark of a generation ago, "When Worlds Collide." The book isn't even listed in his page of credits, though "Gladiator," his superman yarn, is there, and so is "The Disappearance," and of course "Tomorrow!"

The vitriolic author of "Generations of Vipers" has done some rethinking of the atomic holocaust story. The good little town that was saved in "Tomorrow!" because it kept up its civil defense program wouldn't stand a chance in this new war. Russia has decided that the most efficient way to settle the Cold War is to wipe out all human life in the northern hemisphere except a core force of her own people, burrowed deep under Siberia. With the West out of the way, the Soviet will be free to threaten the same fate to the surviving peoples unless they accept the blessings of total communism—fast!

Fourteen people are in a fantastic shelter in the heart of a limestone hill in Connecticut when the war starts. It cost a rough quarter of a billion to build and equip, but a few technical problems arise even so. To cope with them we have a Jewish physicist, a glamorous Chinese mathematician, the rugged individualist, his alcoholic wife and his beautiful daughter, the latter's playboy fiance, an Uncle Tom butler with *his* Lena Horne daughter, a Japanese gardener's son, and the meter reader. Later they dig out the tycoon's Italian mistress, *her* boy friend, and a couple of children.

Once upon a time Philip Wylie would have had these fourteen "vipers"—standins for the human race—tear each other to bits out of sheer cussedness. Instead, they watch the world do it, via TV; for themselves, they're all quite noble. Personal frictions and technical problems eliminated, they have one left: how to get out, with the continent hot and nobody answering their radio calls for help.

Of course, such plot as is here and such detail as has been stirred in are secondary to the author's purpose: a fictional warning of the consequences of nuclear war. He would have made his point much better in an out-and-out polemic.

THE IMMORTALS
by James Gunn
Bantam Books, New York. No. J-2484. 1962. 154 pp. 40¢

In four loosely connected episodes, which began here in Astounding in 1955 with a story called "New Blood," James Gunn traces the process by which Organized Medicine brings human—or at least American—society down in ruins.

His trigger is the discovery of Marshall Cartwright, the accidentally immortal man whose blood carries gamma globulins that repair diseased tissues, drive off old age, rejuvenate shriveled glands, grow new teeth, turn white hair black, and otherwise bestow the vigor of youth on those who have transfusions. An agency is set up through which a syndicate of aged tycoons hope to find Cartwright and his children, trap them, bleed them, and establish a firm corner on immortality. Meanwhile Medicine is trying to synthesize the "elixir" and to find other routes to a monopoly on forever.

Meanwhile, too, certain social forces are at work. Not long ago the Pittsburgh *Press* ran a Saturday feature: "One in Eight Unable to Pay Hospital Bills." It describes the present grumblings which develop into a roar in "The Immortals"—a situation in which the need for medical care for the populace is theoretically met through prepayment plans. But when people can't pay, they are legally seized and their forfeited organs put into banks from which the hospitals can draw replacements for the played-out parts of their wealthy and immortalized patrons. The cities crumble, society goes insane, the doctors are in a state of civil war in

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which only an armored—and armed—ambulance will venture out into the city streets to make a "house call" on a paid-up subscriber, or to grab a defaulter for the gut bank.

Part Two, "Donor," describes the rise of the National Research Institute and its efforts to ensnare a daughter of Marshall Cartwright. In Part Three, "Medic," the nightmare is racing at full speed as an intern goes out on a house call and finds himself up to his middle in personal, medical, political and ethical problems.

Part Four, "Immortal," expands the nightmare into the countryside—to the squads of "squires," sadistic ghouls and head collectors, to an immortal governor of Kansas or Missouri who is another kind of monster, to another young dotcor out from behind the shelter of the Profession, and back to Marshall Cartwright.

Disconnected stories have rarely been fitted together into as consistent a whole. "The Immortals" is very nearly one unbearable nightmare instead of two bad dreams and a pair of midnight entertainments.

THE JEWELS OF APTOR
by Samuel R. Delany
SECOND ENDING
by James White
Ace Books, N.Y.
No. F-173. 1962.
156 + 100 pp. 40¢

James White's story about the last man on Earth shows not the slightest trace of the nice combination of humor, imagination, characterization and sense of the bizarre that made this English author's stories about an interstellar hospital outstanding. His hero is a physician, put into "Deep Freeze" until medicine shall have advanced far enough to cure him of leukemia; when he awakes, the hospital is staffed only by robots. He gets them shifted over from a pro-

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gram of caring for him to one of searching the Universe for traces of Man and restarting the life process on a sterile Earth, sleeping through the millions of years while the program doggedly moves along.

The basic "thought variant"—the last man stimulating a robot society that replaces him, and that in turn recreates Man—would have been enough to carry a long novelette in the early days of Astounding. It isn't now.

As for the outrageously fantastic, romantic and gorgeously implausible yarn on the flip side, to my archaic tastes it is worth a shelf of "Second Endings." This is the one about a far future—some fifteen hundred years far—in which nuclear wars have remade the Earth and its creatures. Primitive religions preserve the memories of science in terms of magic and ritual, human and other monsters have formed new and terrible races, the archaic nightmares of Man's dead past have been solidified, and a new heroic age is on the face of the world.

In the portion of Earth known to the protagonists there are two hereditary enemies, Leptar and the grim island of warlocks, Aptor. A strange triumvirate enlist in the service of the incarnation of the Goddess Argo —the giant, hot-tempered Urson, the scholarly poet Geo, and the four-armed telepathic boy they call "Snake." Their mission: to penetrate the temple of Argo's rival, Hama, on Aptor and steal the last of three powerful jewels that hangs on the idol's forehead. The obstacles: but that is the story, full of fantastic glimpses and bits of bizarre beauty, of horror that has a cleaner side, and with a denouement that lifts the story out of itself. For good measure, the snatches of ancient verse that play an important part in the plot are smooth and chantable. I want to see more Delany. ■

A PLACE FOR THE SUBCONSCIOUS

continued from page 6

He derived from those postulates certain conclusions. That his conclusions were absolutely validly derived, by perfect logic, could be checked. But there was no means whatever of cross-checking the process by which he had abstracted those postulates from the data.

Kepler's laws of planetary motion were simply observational rules-of-thumb—they were not "logical" or "rational," but simply pragmatic.

Newton's postulates—his "Laws"—could not then, and can not now, be provably derived from the data he used. There is absolutely *no known method* of going from the data Newton worked with to the postulates he reached. That his thinking process in doing so was sound absolutely cannot be proven, even today. We do not know how postulates can be abstracted from data. Men can do it; this we know as a pragmatic fact. How they do it we do not know.

Certainly Newton's postulates were "proven" in his own lifetime; "proven" in the narrow sense of "shown to be useful in predicting real phenomena in the real universe."

But in that sense, Ptolemaic astronomy had been "proven" too, a millennium or so earlier.

It is because we still do not know how to do what all men do constantly in their lives—abstract postulates from observation—that we can not design a machine that can think, nor help the psychotic to re-abstract and correct his postulates. (And can't re-abstract and correct our own false postulates either, of course!)

In the course of developing computers—modern terminology prefers that word rather than "robot brains" —men have been forced to acknowledge gaps in their understanding of thinking that they were able to glide over with a swift, easy, "you know what I mean . . ." previously. There was the method of "explaining" something with the magnificent phrase "by means of a function" so long as you didn't have to specify what the function was, or how it operated.

Robots, however, have a devastating literal-mindedness. They tend to say, "Duh . . . uh . . . no, boss, I don't know what you mean. Tell me." Even more devastating is the robot's tendency to do precisely and exactly what you told it to do. The gibbering feeling that can be induced in the man trying to instruct a robot can be demonstrated beautifully by a very simple little business. Makes a wonderful way of explaining the problems of automation and cybernetics to a nontechnical audience—or a technical audience that's never worked with that kind of problem. Try this one in a group some time:

"Assume that I am a robot. I—like all robots—follow orders given me with exact, literal, and totally uncaring precision. Now each of you, of course, knows how to take off a coat; all you have to do is to give me directions as to how to take off my coat."

Usually the instructions start with "Take hold of your lapels with your hands."

This is complied with by taking the left lapel in the right hand, and the right lapel in the left hand—since the intended positions weren't specified.

"No . . . no! Take the *left* lapel with the *left* hand, and the *right* lapel with the *right* hand!"

You do. Taking the left lapel somewhere up under your left ear, and the right lapel at about the level of your right-side pocket. When the order is corrected—i.e., adequate precision and completeness of instructions have been worked out—the next step is usually "Now straighten out your arms."

This allows of many interesting variations. You can straighten your arms out straight in front of you, making ripping noises as you do so since the robot could, we assume, tear the cloth readily. Or you can straighten them straight out to the sides, or straight up—with ripping-noises sound effects in any case. Or, naturally, any combination that happens to appeal to you; the order was positive, but not explicit.

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Usually about this time the audience has a genuine realization that stating explicitly what you mean, in even so simple a matter as taking off a coat, is no easy task. From that point on, the difficulty and frustrations of trying to design automatic machinery can be understood a lot more sympathetically.

This is the first, and simplest level of working with a system that is perfectly logical, but not rational. The results the instructor gets are the logical consequences of the postulates—the orders—he feeds into the logical-not-rational system.

Very recently, Dr. Gotthard Gunther, working at the Electrical Engineering Research Laboratories of the University of Illinois, has developed a formal, codifiable system of mathematical hyper-logic—I must call it "hyper-logic" simply to distinguish the fact that it goes beyond the multi-valued logics that have been common heretofore, and possesses characteristics and potentialities never before available. It is, in effect, a formal-mathematical map for the design of a *conscious* computer. It is, also, a formal system making possible pattern-type thinking; it may, eventually, lead to the development of a formal, codifiable system of abstracting postulates.

The essence of consciousness is typified by the famous "I think; therefore I am." It doesn't, actually, prove existence—but it does prove consciousness! It is one thing to think; it is perfectly conceivable that an entity capable of thinking did so without the slightest awareness that it was doing so. It would be an unconscious thinker.

The essence of consciousness is thinking, and simultaneously being aware of that action. Dr. Gunther points out that consciousness is a reflective process—and requires for its existence (1.) a thinking process, (2.) a simultaneous parallel thinking process observing the first, and (3.) a system of relationships between the two such that the reflection is possible. (That is, for a mirror image to be seen, there must be an object, a mirror—and light, establishing a relationship between the two.)

All the standard logical systems, from two-valued Aristotelian to *n*-valued types such as Korzybski and others have eulogized, have one thing in common that make consciousness impossible within them: they are essentially linear systems. "Linear" in the technical sense of being one-dimensional—all points-on-a-line. (Not necessarily a straight line—as circular arguments atest!)

"Goedel's Proof" that there are true propositions that cannot be proven true by any logical process rests, in essence, on his demonstration that all possible logical statements can be arranged in an ordered, numbered system—that all possible logical statements can each be assigned a unique, defining number in the sequence of numbers.

This proof would *not* apply in a planar system—a system existing not in a line, but in a plane.

Since Dr. Gunther's monograph introducing his work is some two hundred pages long, any description of the general idea given here is completely inadequate—and in logical processes, inadequate is equal to "invalid."

In vague, general terms, Gunther has introduced the concept of a hyper-logical system having *not n* values along one linear array, but a formal system having *n* values along *two orthogonal axes.*

The result is a formal-codifiable system of describing and relating two separate, simultaneous linear processes—because, in a plane defined by two orthogonal axes, two lines can be described, and their relationships specified.

This makes possible the fulfillment of a conscious logical process, in a fully defined, formal-mathematical sense. In other words—the basic description of *the processes necessary for a conscious, logical machine!*

Note carefully: this does not give us a *rational* machine yet—but it does make possible a machine which could correctly answer the question "Are you operating?"

Again necessarily in vague, general terms, the way Gunther has achieved a meaningful orthogonal axis of analysis is to use the long-recognized true-false axis as one of his two.

The *n*-valued logics have, in essence, simply divided the ancient true-false axis of Aristotelian logic into a spectrum of *n* steps. Call the steps truth-probability, and say Truth ranges from probability 1.0000 . . . to probability 0.0000 . . . and there are *n* logic-values. But they're still all on the one axis from True to False.

Gunther has introduced an orthogonal axis. One way of expressing it—remember the monograph is an extremely dense, tightly reasoned document, and any effort to abstract it to this necessary extent is inherently inaccurate—is to say that the orthogonal axis is *relevancy.*

In formal logic, there's the hidden assumption that *any Truth is absolutely relevant—absolutely necessary.* The concept of probability assumes that if a thing is one hundred per cent probable, it is one hundred per cent inevitable.

There's room for doubt. It may be one hundred per cent probable—but entirely irrelevant. A past event, for example, is one hundred per cent probable—i.e., it did in fact happen—but that doesn't mean that it's relevant to a present discussion.

Typically, many a logician has said, "You must agree with me that . . ." and given a truth-proof of something.

But I can, very properly, assert "I don't care whether it's true or not; it doesn't have anything to do with me."

In order to handle just such real-world problems as that, we have long needed some means of formally codifying both the truth-value—probability-value—of a statement, and its relevance-value. Means of doing just that should be developed from the basic work Dr. Gunther has done. Means of *measuring* relevancy, so that we can say a statement, in a particular situation, has a "probability-of-truth value of .9, and a relevance value of .5, yielding a "meaning value" of .45."

The present binary type computers are, in essence, operating on a pure

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true-false system, with no probability-spectrum built in. (That is, normally, supplied by the program assigned.)

A conscious-logical system would have the characteristic of being able to do logical processes, while observing that activity logically, and evaluating the relationship between the two. Theoretically, such a system would be capable of self-repair, being able to observe not only *that* there was an error, but *what kind of error* there was.

That is, such a machine could be given overall instructions in the how-to-take-off-your-coat problem such as "Do not tear the coat, or overstress your own components," and be able to use that generalized instruction *consciously*. You can't get that effect with a force-limit order; that problem is typified by the problem of ordinary household wiring systems and fuses. The fuse is, in effect, a force-limit "program" written into the system. The force-limit is appropriate to the 20-ampere-maximum load of the air-conditioner motor . . . but will make a charred mess out of the light-duty blower-motor in the air conditioner if it gets into trouble. The fuse has a 20-amperes-maximum limit instruction; that instruction is relevant and appropriate to the main compressor motor; it is irrelevant and inappropriate to the blower motor.

A conscious machine, capable of applying the test of relevancy to a problem, could handle such problems.

There is, in this new formulation part of the overall thinking process, another highly interesting hint. Psychology has long and acutely been aware that the conscious mind is by no means all, or even the most important part of the total "human mind." That there is some mind-structure called by various names—"the subconscious" is the most widely used—has been painfully evident to anyone trying to define human behavior and/or thinking. But there have been various plaints, in various tones ranging from prayer to furious blasphemy, as to why God—or the Devil—ever complicated human problems by intruding any such obviously jerry-built unnecessary contraption.

The unfortunate part of it is that conscious thinking simply isn't able to control the subconscious. "A man convinced against his will is of the same opinion still," is an old statement of the problem. You can convince the conscious and logical mind . . . but the stubborn, willful, irrational, damnable subconscious remains in control!

Dr. Gunther's formal analysis appears to suggest the reason for this.

To be conscious requires two separate lines of thought simultaneously operating, with a pattern of relationships operating between them.

This means that the conscious mind can be conscious only if an immense computer system, capable of operating in a planar system, carrying on two-lines-and-the-pattern-between simultaneously is in operation.

And all, actually, to handle one, linear-logic problem, with cross-checking.

That same computer-mechanism, freed of the requirement of maintaining a two-lines-with-cross-relationships system, could handle problems of immensely greater complexity—multi-dimensional problems, instead of mere points-in-a-logical-line problems!

But *only by turning off the consciousness effect.*

In other words, your mind may be capable of operation in two modes: 1. The Conscious Mode, in which two separate lines of logical thinking are operating, with cross-relationships. 2. Or as a non-conscious system capable of multi-dimensional thinking, capable of handling problems of a hyper-logical order which can neither be solved by, nor the method of solution represented to, a logical-linear system. Remember that all two-dimensional figures, when projected on a one-dimensional, linear system, are absolutely indistinguishable!

And this would mean that you would have to solve all your more complex problems by relinquishing consciousness—i.e., turning it over to the subconscious—and that many of the solutions derived by the subconscious planar-type operation of the mental computer could not be interpreted consciously. Only the essential operating instructions could be transmitted!

Thus Newton abstracted his Laws from Kepler's data, and could present those essential operating instructions, and could make logical-linear derivations from them. But he could not explain how he went from Kepler's data to his Laws . . . because that was a subconscious-planar-hyper-logical process!

To the planar-thinking subconscious, the conscious mind's inability to distinguish between logically-identical but hyper-logically totally dissimilar problems must be annoying. (The shadow of a square on edge is exactly the same as that of a triangle of equal base line, a circle of equal diameter, or a wild doodle of equal extreme excursion. Measuring the shadow-lengths would assure you they were all exactly equal.) The result would readily explain why a man convinced against his will—the subconscious knows damn well that triangle-shadow is not at all like the circle-shadow—is of the same opinion still.

A man cannot be convinced by any amount of data. (Data is merely True; you haven't demonstrated that it's also relevant.)

Men have long complained that people act illogically. (Hyper-logical action would be rational, but not logical.)

The big trouble is . . . the subconscious system definitely can and does solve problems the conscious cannot, but to do it, unfortunately, the cross-checking system inherent in consciousness is sacrificed.

And because the planar system is incapable of cross-checking, it can be incredibly foolish.

Until someone comes along with a mind built with a *third* axis-of-analysis—a mind capable of relating two planar thinking processes—we will not be capable of conscious intuition.

And, of course, *he* won't be able to cross-check his new level of thinking!

The Editor

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BRASS TACKS

continued from page 5

Dear Mr. Campbell:

I was rather puzzled by some aspects of Mr. Snell's letter in the November issue, though I did not read the article of yours he was referring to. He says that "thinking in words" requires slight motions of the "voice muscles." In the first place, what does he mean by "voice muscles?" Does he mean the muscles used in all the articulators used in speech—including tongue, velum, uvula, pharyngeal walls, glottis—or does he mean simply the vocal cords, which are the articulators which supply *voicing* to our speech? If he means the whole works, I am not necessarily in disagreement with the theory of subvocalized thinking, although its extent has not yet been fully measured. However, the experiments he suggests can prove nothing at all. While swallowing or holding your breath, it is still perfectly possible to move *every one* of the articulators used in speech. Of course, you can't talk while swallowing, since speaking requires the use of a vibrating air stream, and in swallowing the mechanisms that provide lung air, pharyngeal air or mouth air cannot function; but there is no reason at all why the speech organs cannot be moved simultaneously. While holding one's breath, even in a swallowing position, it is also possible to use mouth air (by making a closure with the back of the tongue, the way Bushmen "clicks" are produced) to produce brief utterances.

Lest it be argued I am merely "theorizing," let me mention I have tried Mr. Snell's experiments and have demonstrated that it is empirically possible for me not only to think and write during them, but to consciously subvocalize.

DON LAYCOCK

■ *Well—that constitutes both a valid experimental test, and a theoretical test of the proposal!*

Dear Mr. Campbell:

While I do not think that drinking, or for that matter talking, writing, or even thinking other thoughts has any particular effect on the continual conversation I carry on with that most interesting of conversationalists, myself, I am afraid that merely stating that belief would cause Mr. Snell [Brass Tacks, Analog, November 1962] to class me among those people "A bit more skillful in fooling themselves." Therefore I have performed the following experiment, which I invite Mr. Snell to attempt.

I have found after repeated trials that it takes me almost fifteen seconds to think, *not* sub-vocalize, the quotation, "To be or not to be . . . what dreams may come must give us pause." Then, arming myself with a glass of water, I attempted the same experiment, alternating drinking and dry runs. At first I did stop the quotation, but when I first raised the glass to my mouth, *not* when I swallowed. As soon as the motions of my hand became automatic, there was no difference in time between wet and dry runs. Perhaps the period of time spent in swallowing was less than I could detect, but I doubt it.

As much as I would like to appear unique in my ability to think and drink, Mr. Snell will have to preform a similar experiment before I will accept his conclusions.

This is not to say that those thoughts which are sub-vocalized would not be of great value to the scientists, but I do believe that to say that all thoughts were sub-vocalized is a considerable exaggeration.

FREDERICK NORWOOD

■ *However, I believe universal agreement can be had that drinking ethanol solutions rather than plain water, does interfere with thought, as well as vocalization.*

Dear Mr. Campbell:

I found your editorial, "'Finagle's Factory," very interesting in many respects. As you say, the terms of the "science" are hard to define. We say we have a democracy, the Soviets say that no, they have a democracy, and Britain is just as positive that they are democratic. You say that one of the "Finagled Truths of the democracy concept is that the will of the people is never wrong." You also illustrate this "majority right" concept with the example of Governor Barnett, the representative of the people of the state of Mississippi, acting to instrument their will.

While I am no political "scientist" I can see the false premise involved. The democracy to which you refer is that expressed in idealistic form by high school textbook writers, that democracy is "government by the people." However, I believe that a more practical and workable definition would be "government *for* the people."

By this definition both the Soviets and ourselves may call our systems democracies because both governments serve the people. That the Soviet government operates under the philosophy of Communism and believes that the individual doesn't know what's really good for him has nothing to do with it.

This definition also makes elected officials in the United States responsible for their actions. After election it is their duty to perform the functions of their office in a manner that will serve the people, not merely reflect the peoples' often poor judgment in matters of law, economics, et cetera.

When I vote for a man, whether on a city, state, or national level, I like to think that he will exercise his own judgment and knowledge-from-experience, not follow my own ill-informed or poorly grounded ideas about subjects on which I am not an authority.

DAVID B. WILLIAMS

■ *Your last two paragraphs assume the proposition "The voter doesn't know what's really good for him," don't they? It's unfortunate that only those wise enough to be humble feel that—the dopes never doubt their own wisdom.*

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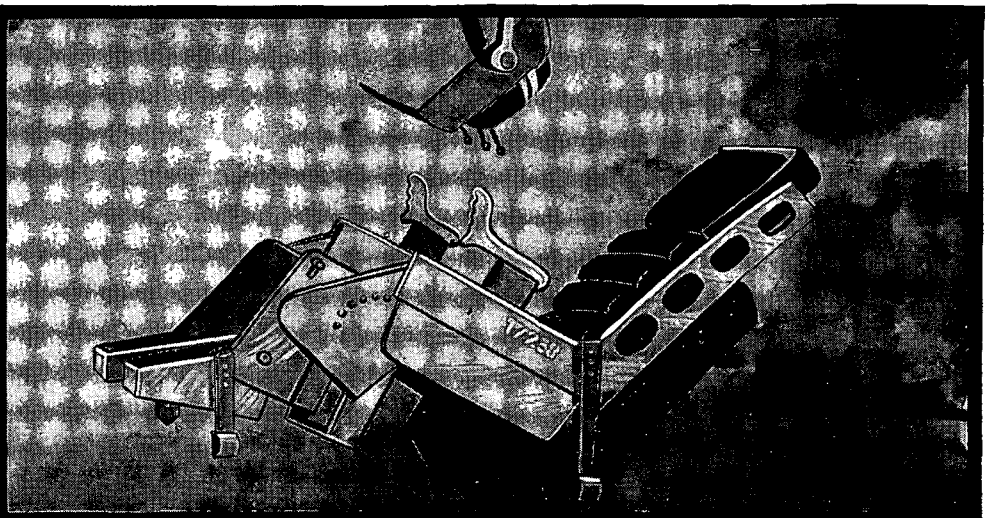

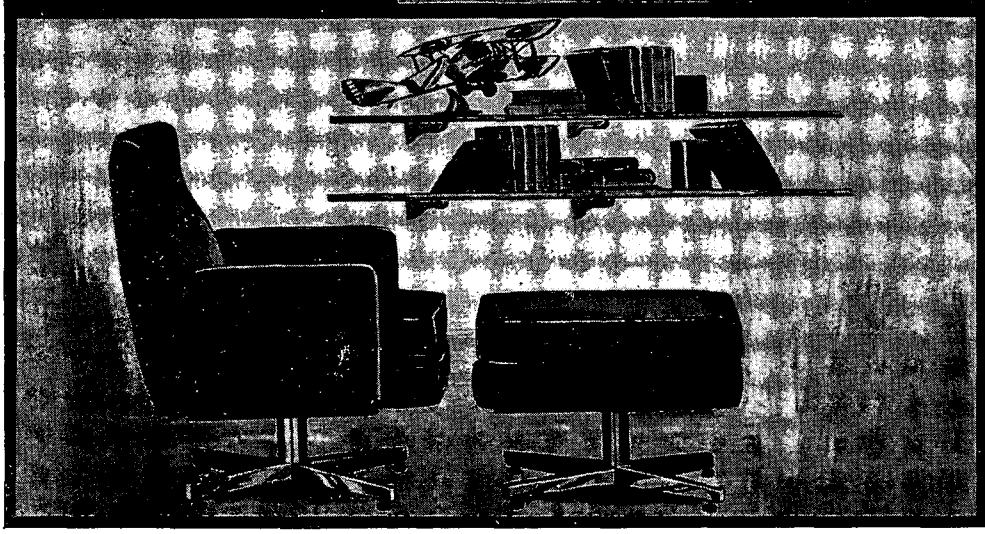

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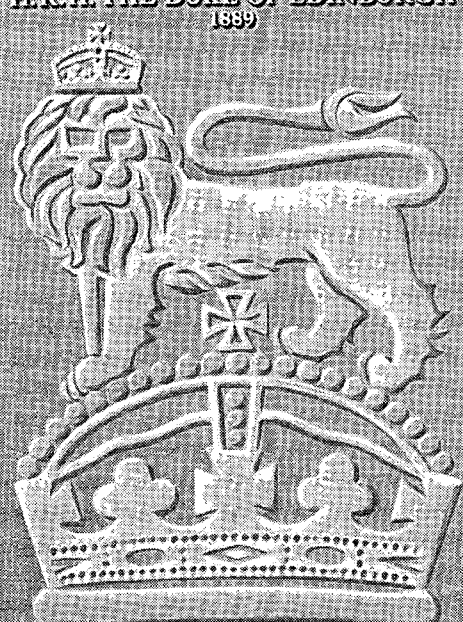

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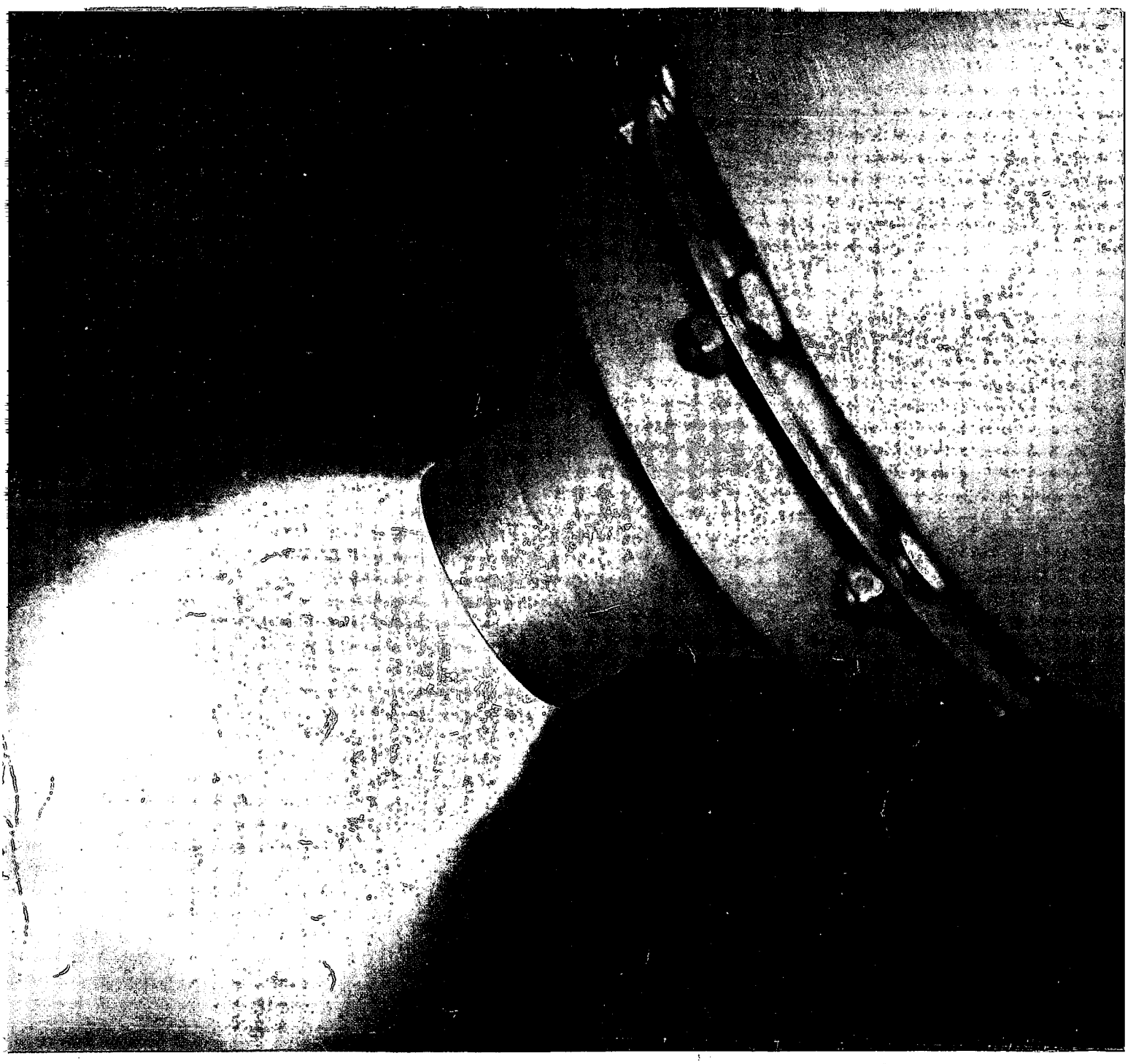

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